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ANALYSIS OF METEOROLOGICAL CONDITIONS OF CUDDALORE DISTRICT

J. Ashok[1], S. Senthamil Kumar[1], P. Satheesh Kumar[2] and M. Jeganathan*[3]
[1]*Department of Architecture, Periyar Maniammai University, Thanjavur - 613 010, Tamil Nadu, India.*
[2]*Department of Environmental and Herbal Science, Tamil University, Thanjavur - 613 010, Tamil Nadu, India.*
[3]*Designed Environment Academy and Research Institute, Trichy - 621 213, Tamilnadu, India.*

Abstract

Cuddalore falls under agro - climatic zone and have a true mean time climate with a least variation in maximum and minimum temperatures throughout the year. The data were collected during the years 2012 – 2015. The data reveals that the maximum temperature recorded to be around 35 ^{o}C all through the years in Cuddalore district. The minimum temperature in all these places was just around 25 ^{o}C. These results were supported by water policy for Cuddalore. The relative humidity was found to be in the range of 65 – 90 % all though the study period at the sampling station. This temperature variation and humidity result in a warm, pleasant sea Cuddalore. This type of weather results in a humid weather in the study area. Rain season was reported to last for 180 days in a year. The wind velocity recorded depicts the maximum valve during January –March and minimum during April – June during the study period. Normally, wind speed was affected by a number of factors and situations operating at micro to macroscales.

Key words: Wind Speed, Wind Direction, Humidity, Temperature and Cuddalore district.

1. Introduction

Cuddalore district has high potential for marine as well as inland and brackish water fisheries. The district has a coastline of 68 km. Fish are plentiful in the tanks. The marine fisheries provide a living for a large number of persons. Pomfret, seer fish and mullet are among the better known kinds of fish and the oysters of the Cuddalore backwaters enjoy a more than local fame. There are 8104 ha of inland water resources, 5986 ha of major irrigation and long 70 seasonal tanks, 312 ha of Fish Farmers Development Agency (FFDA) tanks, 1,000 ha of derelict water and 806 hectare of Aquaculture farms. Forty five marine fishermen villages are located in the district with total marine fishermen population of 47,000 of which active fishermen are around 23,840. The total members in the marine fishermen cooperative societies are 15,133 and members of fisherwomen cooperative societies are 13,094. The fishing fleet of Cuddalore district includes 606 mechanized boats, 1010 motorized country crafts and 5580 traditional crafts (Tamil Nadu Marine Fisherfolk Census, 2010). There are three fish landing centers for mechanized boats in Cuddalore, Parangipettai and Mudasalodai. There are 28 Inland Fishermen Cooperatives Societies with a total membership of 2600 fishermen and 400 fisherwomen. In the inland sector, there are 15 fish rearing centers in the private sector. There are 164 shrimp aqua farms with 366.41 hectare water spread area. In the inland fish landings, Catla,

*Corresponding author: **M. Jeganathan***
E-mail: jegann1978@gmail.com
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Rohu, Mrigal, Common carp, Silver carp and Prawns of fresh water are important.

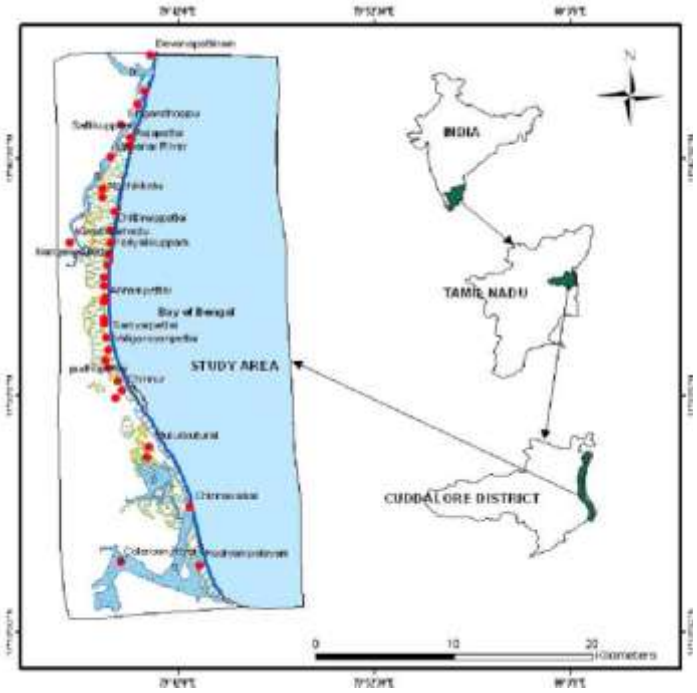

Fig – 1: Coastal region in the study area

The rapid industrial development has resulted in severe environmental pollution of all the segments constituting the biosphere. The extent of pollution was found to be based on the meteorological conditions too. Hence, for any of the air polluting industry a thorough investigation of the meteorological condition becomes a must. Reddy and Suneela (2001), Rangarajan and Marichamy (2011) and Gujral *et al.* (2001) have studied the dependency of the concentrations of pollutants, their dispersion and diffusion on the meteorological conditions such as temperature, wind velocity and mixing. They have reported unstable conditions during night time.

2. Materials and Methods

The micrometeorology and microclimatic parameters were recorded by installing an automatic weather monitoring station (Envirotech WM 200) near the District Collector Office complex at about 9 m height. Data of wind velocity, wind direction, ambient temperature and relative humidity were recorded at hourly intervals. Wind velocity and wind direction were recorded by means of a cup anemometer and wind vane. Ambient pressure was recorded by a temperature sensor. Relative humidity was computed from reading in Hygrometer.

3. Results and Discussion

The environmental quality in terms of micro meterological parameters were assessed at different sampling stations of the Cuddalore district and were tabulated in Table - 1 to 4.

Temperature

The meteorological condition of Cuddalore were assessed during the study period and tabulated in Table – 1 to 4. During the year 2012, the maximum temperatures have been recorded during April (34.2 ^{o}C) and a minimum has been recorded during the June month (25.1^{o}C). For the year 2013, highest temperature 34.1 ^{o}C has been recorded during March and a minimum 24.9 ^{o}C have been recorded during April. For the year 2014, higher temperature, 35.1 ^{o}C was recorded during April and the lower temperature around 25.1^{o}C was recorded during the July month. The same trend has been noticed for the year 2015. A maximum of 34.9 ^{o}C was noticed during April and a minimum value has been noticed March (24.6 ^{o}C).

Relative humidity

The relative humidity was found to be a maximum during the early hours of the day (88.5 %) in the month of June, and a minimum value obtained was 70.6 % during February 2012 and this value correspond to the sun set period. And for the year 2013, the month of October has experienced higher relative humidity of 85.5 % and during the hottest months of the year, April the value of about 69.6 % has been recorded. But for the year 2014, the highest relative humidity has been recorded during July (86.5 %) and the minimum was noticed during February and the value of 70.6 %. During 2015, the relative humidity was higher in the month of July (around 88.1 %). Though, there was a reduction of relative humidity during the hotter months the humidity has not reduced more than 70.5 % during March respectively.

Table - 1: Micrometeorological data for the year 2012

Month 2012	Wind Velocity (km/hr) (Max)	Predominant Wind Direction	Temperature (°C)		Relative Humidity (%) Avg.
			Min.	Max.	
January	34.6	ENE	22.8	33.8	70.3
February	38.2	NE	24.1	32.3	71.5
March	32.7	NNE	26.9	34.1	69.8
April	43.8	NE	25.2	33.7	75.7
May	19.6	SW	23.8	30.6	84.6
June	28.1	SW/SSW	20.2	29.9	87.9
July	23.8	SW	21.1	30.8	85.2
August	34.2	SW	22.7	32.1	81.7
September	26.2	SSW	22.8	32.8	78.1
October	21.3	WSW	23.1	31.6	74.9
November	24.8	NE	24.8	33.7	77.2
December	22.4	NE	22.5	32.8	72.8

*(NE - North East; ENE - East North East; E – East; SW-South West)

Table – 2: Micrometeorological data for the year 2013

Month 2013	Wind Velocity (km/h) (Max)	Predominant Wind Direction	Temperature (°C)		Relative Humidity (%) Avg.
			Min.	Max.	
January	39.2	NNE	23.5	32.7	72.8
February	29.3	E	23.2	33.9	68.7
March	27.6	NNE	24.6	34.7	67.1
April	29.2	SSE	26.3	34.2	68.4
May	23.8	SW	24.1	31.9	77.3
June	19.9	SSW	21.8	30.3	81.2
July	22.7	SW	22.7	29.2	86.7
August	21.7	SSE	22.6	29.9	83.4
September	26.7	SSW	23.6	30.7	78.7
October	25.7	NE	24.2	32.6	75.7
November	24.3	ENE	23.1	31.9	74.6
December	27.7	NE	22.8	33.6	71.7

*(NE - North East; ENE - East North East; E – East; SW-South West)

Table – 3: Micrometeorological data for the year 2014

Month 2014	Wind Velocity (km/h) (Max)	Predominant Wind Direction	Temperature (°C)		Relative Humidity (%) Avg.
			Min.	Max.	
January	23.8	ENE	22.9	32.2	71.7
February	22.6	NE	24.1	32.9	69.2
March	33.7	E	24.4	34.0	64.7
April	18.2	NNE	25.3	34.3	69.3
May	26.8	WSW	23.8	32.3	73.8
June	21.2	SW	22.4	31.1	84.2
July	21.1	SW	21.9	30.0	83.9
August	18.8	SSW	22.3	28.2	87.1
September	24.8	SW	22.8	29.4	82.3
October	21.9	NE	23.8	31.8	77.3
November	18.3	NE	24.2	32.8	75.6
December	19.6	NE	23.7	33.4	73.4

*(NE - North East; ENE - East North East; E – East; SW-South West)

Table - 4: Micrometeorological data for the year 2015

Month 2015	Wind Velocity (km/h) (Max)	Predominant Wind Direction	Temperature (°C)		Relative Humidity (%) Avg.
			Min.	Max.	
January	20.8	NE	22.5	31.8	74.9
February	24.6	ENE	24.8	32.9	72.5
March	27.1	NE	25.2	33.8	68.7
April	17.4	E	25.6	34.0	71.7
May	20.4	SW	23.5	32.8	75.6
June	22.7	WSW	22.8	32.9	87.3
July	15.9	SW	20.7	30.9	84.9
August	19.7	SW	21.7	29.9	88.1
September	16.7	SSW	22.8	29.7	84.0
October	24.8	SSE	22.6	31.8	78.3
November	19.5	NE	23.7	32.0	77.3
December	19.5	NE	23.8	33.6	75.8

*(NE - North East; ENE - East North East; E – East; SW-South West)

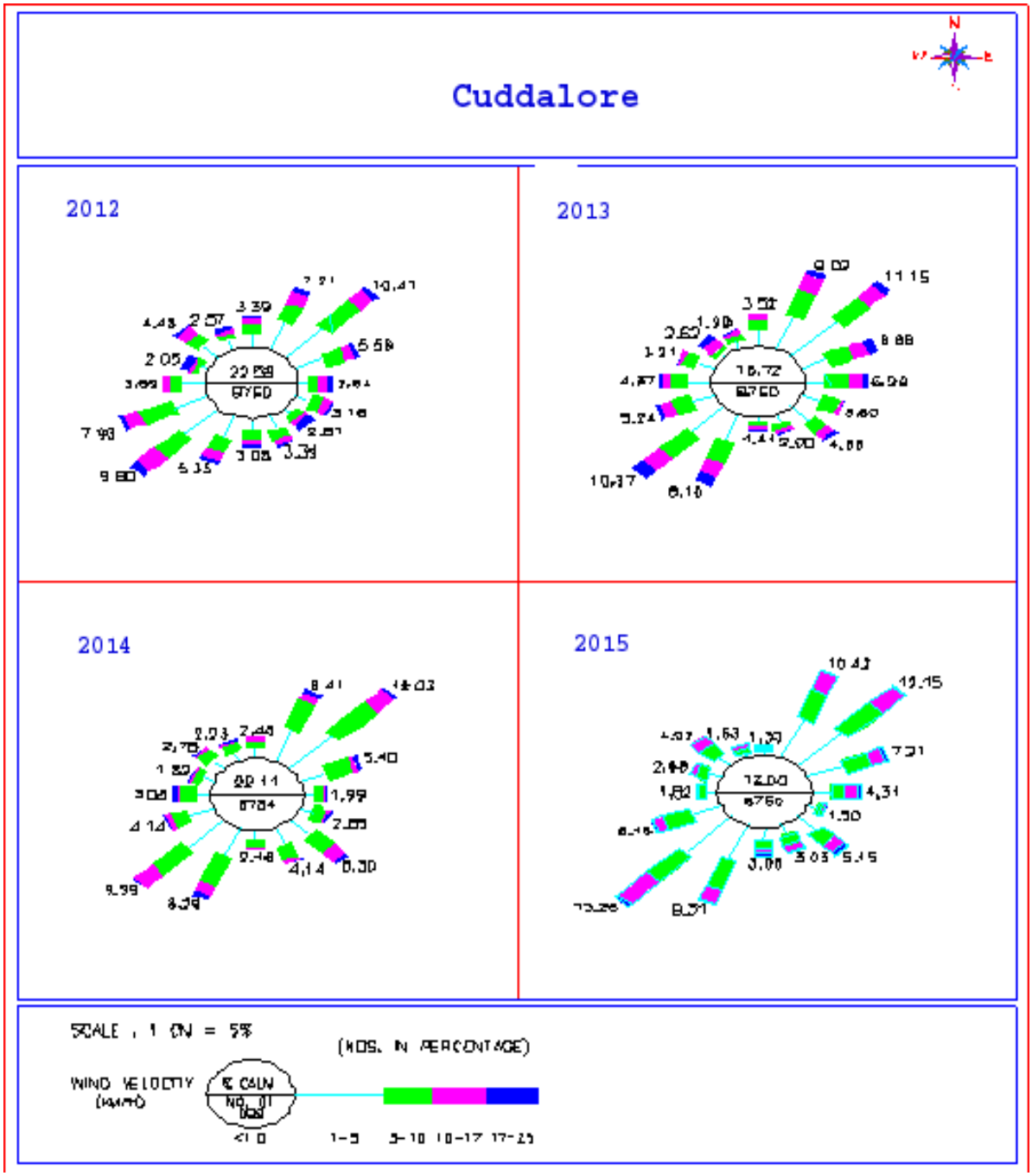

Fig – 2: Yearly wind - rose constructed for the period of 2012 – 2015 in Cuddalore

Average wind speed

As the wind speed is of higher importance with respect to pollution, it was recorded continuously for 24 hrs a day and the average has been represented at 8.30 am and 5.30 pm of every day. Finally, the monthly average has been tabulated. The highest wind speed recorded was 27.6 km/h during October 2012. Whereas, the

lowest value recorded was 14.8 km/hr during May 2012. For the year 2013, the average wind speed was higher during September (27.1 km/hr) and the minimum was during the month of July (16.5 km/hr). And during 2014, the maximum wind speed of 31.5 km/hr was noticed during March and a minimum has been noticed during November 2014 (15.6 km/hr). Similarly, the average wind speed of 31.5 km/hr was recorded during March 2015 and a lower value has been recorded during November 2015 (17.5 km/hr).

Wind Direction

The predominant wind direction recorded during 2012 - 2015 happens to be North - East and at times the dominant direction was NNE and toward west.

Wind Rose

With the acquired meteorological data wind rose were constructed for the period of four years (2012 - 2015) (Fig - 2). Similarly, Viswanadhan and Anil kumar (1986) have studied the dependency of the concentrations of pollutants, their dispersion and diffusion on the meteorological conditions such as temperature, wind velocity, mixing. They have reported unstable conditions during night time. They have also suggested lesser emission of pollutants during night time in the city of Cochin.

Rishbhmodi and Agrawal (1991) and Hemavathi and Shobha Jaganathan (2004) have studied the meteorological data and the data has been utilized for the construction of wind rose. From air pollution point of view, wind direction and wind speed were found to act as important parameters.

4. Conclusion

The data reveals the maximum temperature recorded to be around 35 ^{o}C all through the years in Cuddalore. The minimum temperature in all these places was just around 25 ^{o}C. The relative humidity was found to be in the range of 65 – 90 % all though the study period at all the sampling stations. This type of weather results in a humid weather in the study area. Rain season was reported to last for 180 days in a year. The wind direction which has been documented during the study period is north, east, south and west in all the sample stations. These observations were confirmed with the wind roses.

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