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Seasonal Variation of Physico-Chemical Characteristics of Water in Two Wetlands of Tiptur Taluk, Karnataka

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Abstract

The present study was carried out to evaluate the physico-chemical parameters of Sugur and Bajagur wetlands, located at Tiptur taluk, of Tumkur district, Karnataka. The physicochemical parameters play a vital role in the wetland ecosystems. A significant variation in these parameters was observed throughout the study period and monthly comparisons were made as monsoon, pre-monsoon and post-monsoon. The results of the present investigations are compared with literature values and investigation reveals that there is a fluctuation in the physico-chemical characters of the water this will be due to in flow and change in the temperature as season changes

Keywords: Wetland, Physico-chemical parameters, seasonal variations.

INTRODUCTION

Wetlands are very productive ecosystems, which help in the regulation of biological cycles, maintenance of water quality, nutrient movement and support for food chains. Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. They occur where the water table is at or near the surface of land or where the land is covered by shallow water under the text of their arms or convention. Wetlands are defined as “areas of marsh, fen, peat land” or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six meters. Ramsar convention Burea (2006). Wetlands are world’s most productive environment with stunning biological diversity. Around 4-6% of earth’s surface is covered by wetlands. In addition, they provide refuge for endangered species of plants and animals and economic benefits in aquatic fauna. Wetlands reduce the impact of floods by acting as storage areas. Stored water percolates downward, getting purified in the process, and replenishes the ground water It is interesting to note that wetlands cover a tiny portion of earth surface, but by the nature of their unique ecosystem, it becomes all the more important to protect and conserve them. Wetlands are important components of watersheds and provide many valuable functions to the environment and to society. Mitsch and Gosselink (1993), Mitsch and Gosselink (1994). Now wetlands are shrinking rapidly because of urbanization and industrialization. The physical and chemical characters of the wetlands water can be used to assess the ecological nature of the wetlands. Several studies have been conducted to understand the physical and chemical properties of lakes, wetland and reservoir Rajas Kara et al., (2005). Kambleet al., (2009) and Jindal and Gusain (2007 In such studies the characteristics of water bodies were taken into consideration with reference to physical, and chemical properties. It is a well-established fact that domestic sewage and industrial effluent discharges result in changes of water quality and eutrophication. The other important sources of water pollution include mass bathing, rural waste matter, agricultural runoff and solid waste disposal. In view of this an attempt was made to analyze the physico- chemical parameters of the two wetlands viz., Sugur and Bajagur of Tiptur taluk.

MATERIALS AND METHODS

The present study was carried out in Sugur and Bajagur wetlands located 10 and 15 Kms respectively from Tiptur. It is situated in southern part of Tiptur, and is bounded by Chikkanaikana halli on the northeast, Arasiwetland in the south. Hassan in south west, Tumkur on the east, The Sugur and Bajagur has a catchment area of 16.0 and 14.40 square kilometers (fig-1) Water samples were collected for physico-chemical analysis from different sampling stations. Samples were collected once in every month from June 2010 to May 2011. Water samples were collected in two liters polythene during morning hours between 7:00 A.M. to 10:00 A.M. Atmospheric and water temperature, pH, turbidity, electrical conductivity, were determined on the sampling sites. BOD and DO were fixed on site, while TDS, CL, TH, Ca, Mg, Alkalinity, Acidity, No_3, Po_4, Fe, Si, Co_2, So_4, COD and DOM were analyzed in the laboratory by standard methods (APHA, 2005).

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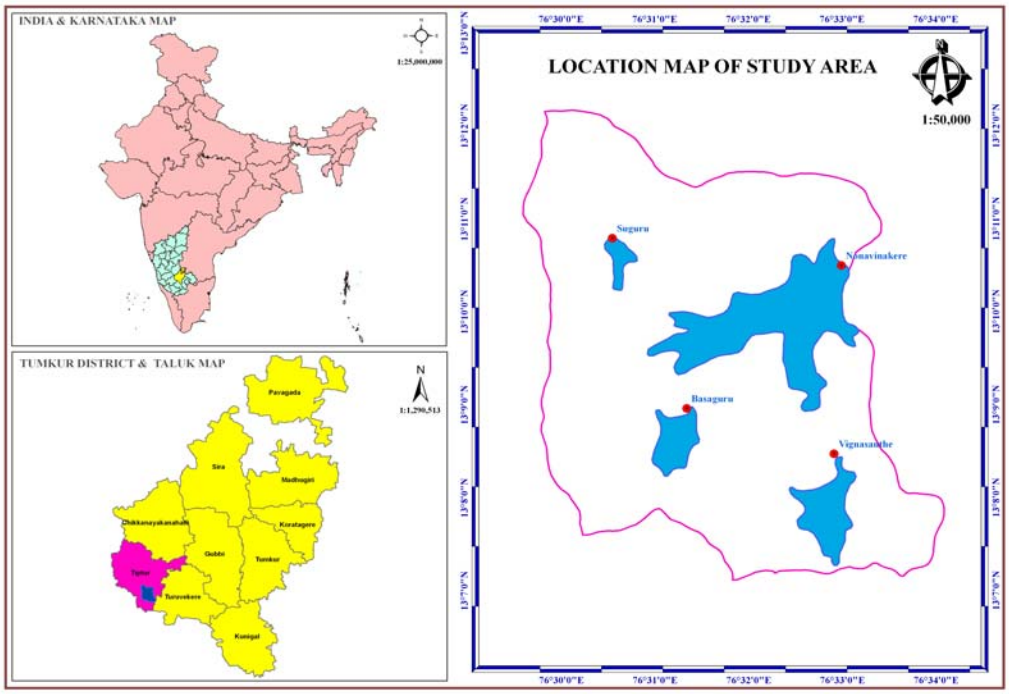


Table 1. Showing theSampling locations with Wetland Names

Sampling location	Latitude	Longitude	Elevation
Bajagur Wetland	13º08'59.6"	76º30'58.6"	825±3
Sugur Wetland	13º10'20.8"	76º30'30.5"	830±4

Note: Elevations are expressed in mts

RESULTS AND DISCUSSION

The average values and standard deviation of the two wetlands are represented in Table 2 and the average seasonal variations are depicted in fig-2, 3 and monthly variations are represented in fig-4.The water temperature in Bajgur is 24.39±2.68oC and 27.48±3.63oC in Sugur wetland respectively. The pH of the Bajgur and Sugur was alkaline and it ranges from 7.80±0.46 and 7.53±0.41 the pH range of the wetlands are in the suitable drinking water standards as described by BIS (7.0-8.5). and pH desired limit was also observed by Kulkarni et al., (2009) .Electrical conductivity is the capacity of a solution to conduct the electric current, in this study the electrical conductivity reported to be in the range of 560.67±179.07µmhos/cm in Bajgur and 265.25±113.28 in Sugur and the maximum values are observed in post monsoon respectively similar observation was made by Sulabha and Prakasam (2006). Total hardness depends on the amounts of calcium and magnesium present in the water. In the present study it ranged between 186.25±54.52 mg/L and 119.75±65.23 in Bajgur and Sugur respectively. The BIS limit of drinking water is up to 200mg/L, therefore water hardness of the water body is suitable for use as potable water. Similar was observed by Khadade and Mule (2003). However the chloride concentration varied from 29.61±15.09 in Bajgur and 94.00± 48.51 mg/L in Sugur. The BIS permissible limit for chloride concentration is 200 mg/L. The total dissolved solids (TDS) values varied between 323.25±112.40 and 157.83±36.45 mg/L which were within the limits of drinking water standards. The limits set by BIS (1991) for total dissolved solid is 500 mg/L. Total alkalinity of water is due to the carbonates and bicarbonates. The values were below the permissible limits. Dissolved oxygen (DO) is one of the important factor in the water body. The main source of DO in water is the atmosphere and by the photosynthetic activity of aquatic plants. Atmospheric oxygen enters the aquatic system by direct diffusion at the surface water agitation. Dissolved oxygen varied between 5.21±1.99 mg/L and 4.53±1.78 mg/L in Bajgur and Sugur indicating the good water quality and is supported by Sahu et al., (2000). Free carbon dioxide ranged from 5.21±1.99 mg/L Bajgur and 4.53±1.78 mg/L in Sugur. Free carbon dioxide exhibited a prominent inverse relationship with the amount of DO and increase in one of these parameters lead to the decrease of others and vice versa. These relationships may be governed by reduction in the autochthonous oxygen supply, decomposition of aquatic vegetation, continuous use in respiration by the flora and fauna and to some extent by the mixing of water.

In the present investigation the maximum concentration of magnesium 33.25±10.08 mg/L was recorded in Bajgur and minimum concentration of magnesium 18.38±7.47 mg/L was recorded in Sugur. Shastri (2000) has stated that when the rainfall is high it depletes the magnesium quantity in water. The higher calcium content of the water is an indication of pollution and eutrophication of wetland. In Bajgur and Sugur wetland the range of calcium observed was 38.38±10.96 and 20.53±7.66 mg/L.

Nevertheless, acidity contents were in ranges of 11.08±4.06 and 12.86±4.13 mg/L respectively in two wetlands. Nitrate and phosphate contents reported in Bajgur and Sugur were in the range of 0.11±0.10 and 0.20±0.24 mg/L and 0.12±0.08 mg/L and 0.20±0.24 mg/L respectively. Although there is no specific water quality standard set for Biological oxygen demand (BOD) but the

WHO standard indicates 6mg/L as a limit and the Bajgur has 3.47±2.17mg/L and 4.17±2.99mg/L respectively. Sulphates are in the permissible limit (250) ranges from 112.33±42.38 in Bajgur and 128.42±43.93 in Sugur. The iron was found 0.07±0.06 in Bajgur and 0.06±0.07 in Sugur and 0.65±0.41 mg/L and 0.20±0.31mg/L silica in Bajgur and Sugur wetlands. The value of iron and silica reveals the fluctuation among the various seasons and are indicated in the figures 2 and 3. Similar observation was also done by Pandae et al (2004) Chemical oxygen demand was 27.46±9.84 mg/L and 25.25±8.35mg/L and dissolved oxygen matter 1.12±0.30 mg/L and 1.63±0.71 mg/L in Bajgur and Sugur. The variation in concentration of inorganic salts was observed to be maximum because of seasonal variation in environmental factors. The above findings agrees with Kulashersthta and Sharma (2006). The study assessed the evolution of water quality in Sugur and Bajagur wetland comparative study of both wetland were carried out by taking certain important parameters. The present investigation reveals that as the season changes there is a fluctuation in the physico-chemical characters of the water this will be due to in flow and change in the temperature as season changes.

Table 2. Average values of physicochemical parameters of the water of two wetlands.

Parameters	Bajgur Wetland	Sugur Wetland
AT	26.44±2.99	27.48±3.63
WT	24.39±2.68	25.44±3.25
pH	7.80±0.46	7.53±0.41
TUR	44.21±20.10	34.86±16.50
EC	560.67±179.07	265.25±113.28
TDS	323.25±112.40	157.83±36.45
Cl	29.61±15.09	94.00±48.51
TH	186.25±54.52	119.75±65.23
Ca	38.38±10.96	20.53±7.66
Mg	33.25±10.08	18.38±7.47
ALK	181.58±46.25	148.00±65.24
Aci	11.08±4.06	12.86±4.13
No3	0.11±0.10	0.20±0.20
Po4	0.12±0.08	0.20±0.24
Fe	0.07±0.06	0.06±0.07
Si	0.65±0.41	0.20±0.31
DO	5.21±1.99	4.53±1.78
BOD	3.47±2.17	4.17±2.99
CO2	1.53±0.92	1.45±0.44
So4	112.33±42.38	128.42±43.93
COD	26.46±9.84	25.25±8.35
DOM	1.12±0.30	1.63±0.71

All parameters are in mg/L except air and water temperature (°C), pH, electrical conductivity (μmhos/cm) and turbidity (NTU)

Fig 2. Seasonal Variation of Physico-chemical Characters of Water in Sugur Wetland 2010-11

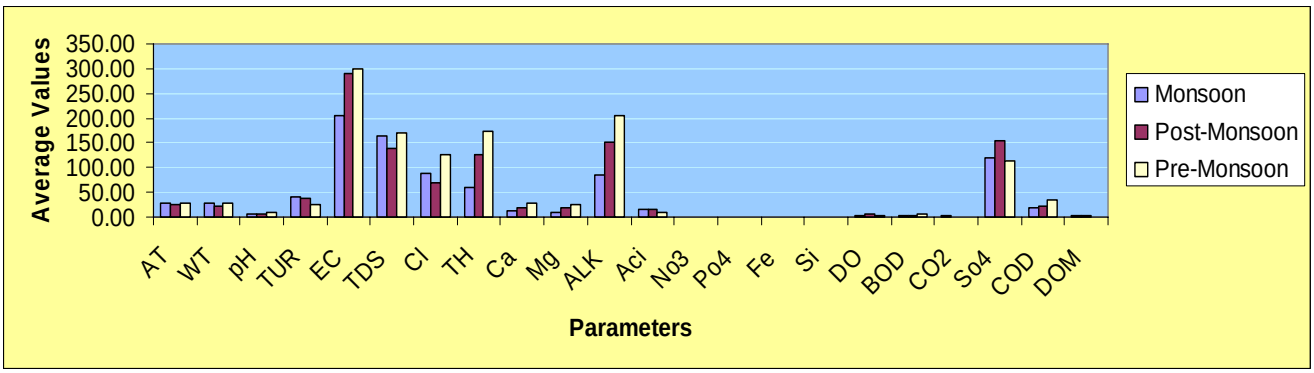


Fig 3. Seasonal Variation of Physico-chemical Characters of Water in Bajgur Wetland 2010-11

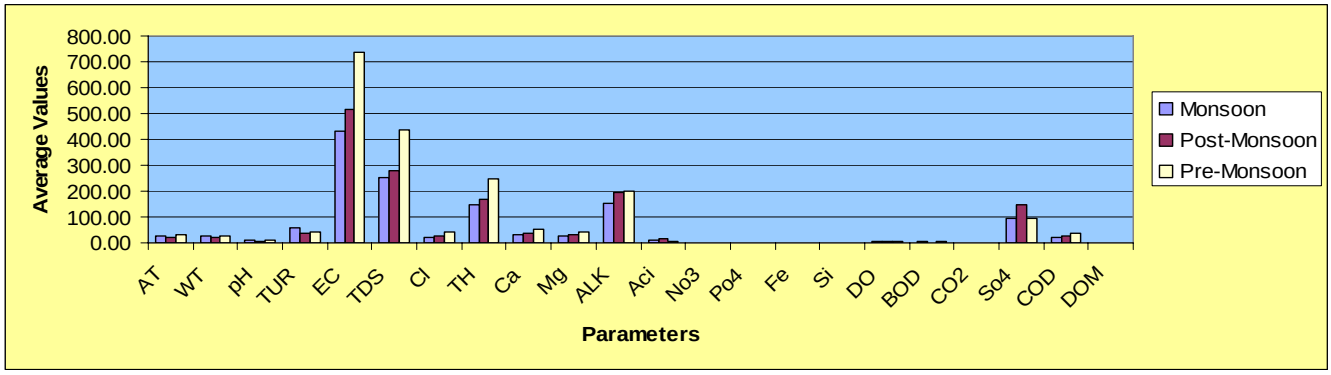
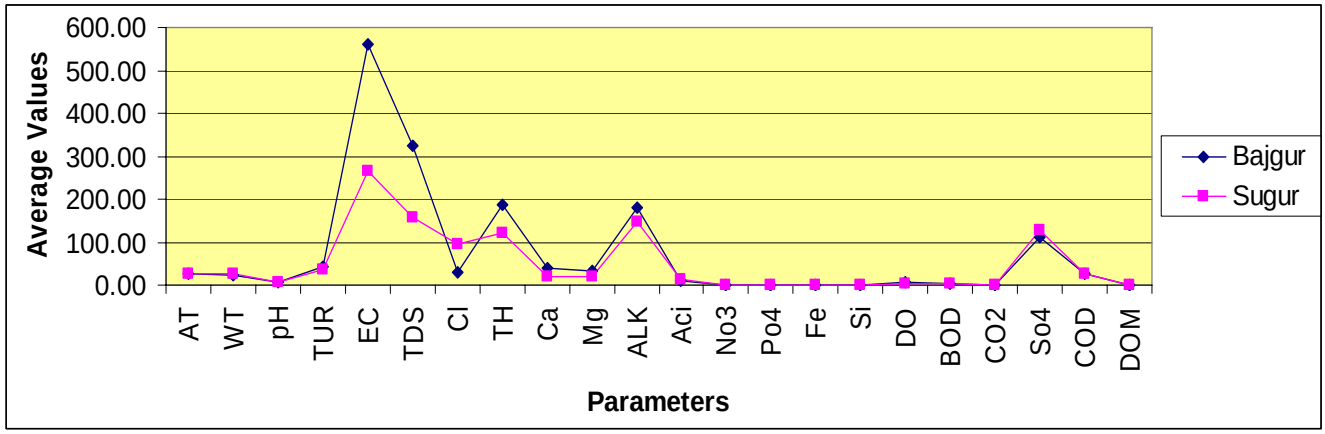


Fig 4. Monthly Variation Physico-chemical Characters of Water in Bajagur and Sugur 2010-11



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