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Seasonal Variations of Physico chemical characteristics of Water in Koramagudda Kere Lakkavalli range of Bhadra Wildlife Sanctuary Mid-Western Ghat Region India.

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Abstract
A systematic study has been carried out to evaluate seasonal variation of the physico-chemical parameters of water in koramagudda kere from 2009 to April 2010. Twenty four physico-chemical water quality parameters have been analyzed for pre, post and monsoon seasons. The pH of the water was found to be more alkaline, the values of do and bod fluctuate according to the seasons and sectors, cod was very less due to absence of chemical pollution. The value of all the parameters is found to be more during pre-monsoon season when compared to monsoon and post monsoon due to their differences in the catchment area and occurrence of high amount of rainfall during monsoon. Other parameters such as calcium, magnesium, sulphate and phosphate, iron ,silica, organic matter, nitrate, nitrite were under permissible limits and widely fluctuated according to seasons and sectors.

Key words: *wetlands, physico-chemical characteristics of water.*

Introduction

Wetlands constitute a treasury of biodiversity. The social demand and dependence of the wetlands provide an unaccountable economic value to such habitats. They are complex water and land interactive systems and are supposed to be the most fertile and productive sites in the world. The Indian sub continent is well known for its species richness, highly varies climate and associated habitats. In this subcontinent lakes and reservoirs are one of the least studied habitats, although, such systems have a great potential for biological productivity and diversity. . Wetlands provide a multitude of services including water purification and regulation of flows, fisheries, habitats for plants, animals and micro-organisms, opportunities for recreation and tourism, and so forth (Wetlands International, 2002) .Wetlands are defined as “lands transitional between terrestrial and aquatic ecosystems where the water Table is usually at or near the surface or the land is covered by shallow water” (Cowardin et al., 1979). Wetlands are often referred to as “biological supermarkets” for the extensive food chain and rich biodiversity they support (Mitsch and Gosselink, 1993). Wetlands provide variety of functions and values like, biodiversity, nutrient recycling, purification of water, flood control and ground water recharge. Physico-chemical analysis is the prime consideration to assess the quality of water for its best usage (Sharma and Sarang, 2004). Life in aquatic environment is largely governed by physico-chemical characteristics and their stability. The chemical factors may be divided into four groups. First, waters are alkaline due to carbonates, bicarbonates and pH, constituting buffer system. Most of the fresh waters are slightly alkaline in nature. Secondly, dissolved gases of oxygen and carbon dioxide are the significant factors responsible for the water quality. The third category contains the ions, which are involved in algal nutrition such as nitrates, phosphates, sulphates and silicates. Nitrates and phosphates show great relation to algal growth. Silicates are useful for only one group of algae such as diatoms. Fourth, dissolved organic substances influence the oxygen levels. Dissolved organic matter, includes a certain amount of organic debris and colloidal substances. Several important concepts in ecology have been developed from studies on the aquatic ecosystems and organisms. The products obtained from wetlands are forest resources, wild life, fisheries, agricultural resources, water supply, energy resources etc. Water is most important chemical compound for the perpetuation of life on this planet. It has many unique properties. Water is the one of most important compound to ecosystem. Good quality of water described by its physical, chemical and microbial characteristics. But some correlation was possible among these parameters and the significant one would be useful to indicate quality of water (Kamble *et al.,* 2009). Contamination of water bodies might lead to a change in their trophic status. Several Physicochemical or biological factors could act as stressors and adversely affect growth and reproduction (Iwama *et al.,* 2000).

Material and methods

Bhadra Wildlife Sanctuary is located in one of the biodiversity hotspots of Western Ghats. Vegetation types of the Sanctuary are unique to this biodiversity hotspot and divided into four forest ranges by the state forest department of Karnataka viz., Lakkavalli, Hebbe, Muthodi and Thanigebylu (Map 4.1).Here we made an effort to cover one range of Bhadra Wildlife Sanctuary that is

Lakkavalli range with an area of 223.17 sq. kms. Lakkavalli section lies from (13° 34' to 13° 46' N latitude and 75° 29' to 75° 45' E longitude) .The study was carried out for a period of two years from 2007 to 2009 in Koramagudda kere that lies in (13° 37' 173" N and 75° 39' 095" E).

The sampling is made at an interval of 30 days and was collected in the morning 7 am to11 am. Water samples were collected by 2 liters blue polythene bottle, physicochemical parameters like pH, air temperature, water temperature of the sample was determined on the spot, dissolved oxygen was also was fixed on the spot, electrical conductivity, total dissolved solid, biochemical oxygen demand, chemical oxygen demand, alkalinity, acidity, free carbon dioxide, chloride, calcium hardness, magnesium hardness, total hardness, phosphate, sulphate, Nitrate, Silica and iron are analyzed in the laboratory by following standards methods as prescribed by APHA (2005).

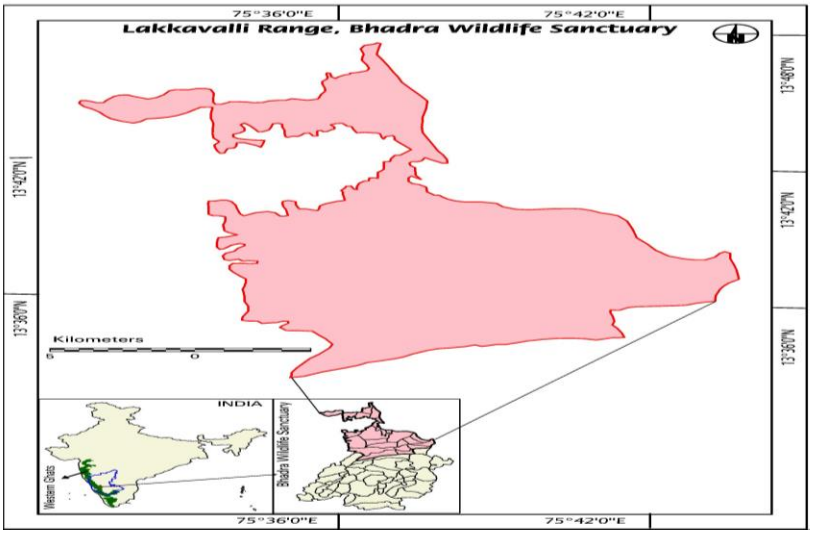

Fig. 1. Map showing the Bhadra wildlife sanctuary with Lakkavalli range

Results and discussion

The physico-chemical parameters of water analyzed in Koramagudda Kere have been described and discussed in relation to their seasonal fluctuations and further for their relationships. The results of physico-chemical parameters are represented in Table1 Seasonal variation of water temperature was high during pre-monsoon season (28.50 ± 5.196 °C)) and low during post-monsoon seasons (22.50 ± 2.082 °C). Similar findings were also recorded by Shiddamallaya and Pratima (2008). It is found that the pH of the water was very alkaline during the pre monsoon .The water pH has showed the highest value during pre-monsoon season in 2009 (7.41 ± 0.249 μmhos/cm), while lowest value during monsoon season of 2007 (7.15 ± 0.238μmhos/cm). Gupta and Gupta (2006) stated that intense photosynthetic activities of phytoplankton will reduce the free carbon dioxide content resulting in increased pH values. The electrical conductivity values have showed the lowest during monsoon season in 2007 (53.00 ± 8.042 μmhos/cm) while highest during pre-monsoon season of 2009 (77.00 ± 7.165μmhos/cm.). Lowest electrical conductivity during monsoon season may attribute to the increase level of water in the wetlands due to rainfall, whereas increase in electrical conductivity may be attributed to decrease in the water level due to evaporation and increase in organic matters such as plant debris enter the wetlands. Similar observation was made by Sulabha and Prakasam (2006). Turbidity values have showed the lowest during post-monsoon season in 2007-08, (4.07 ± 0.306 NTU) while highest during monsoon season of 2009 (18.70 ± 2.88 NTU.).This is in conformity with the findings of Afreen and Naheed (2003). The dissolved oxygen values have showed the lowest during pre-monsoon season in 2009,(4.60 ± 0.535 mg/l) while highest during post-monsoon season of 2008 (8.70 ± 1.153 mg/l).Sahu et al.(2000) reported that dissolved oxygen is generally reduced during pre-monsoon due to increase respiration of biota, decomposition of organic matter, rise in temperature, oxygen demanding waste and organic reduction such as hydrogen sulphate, ammonia, nitrite and ferrous iron. BOD values have showed the lowest during post-monsoon season in 2008, (0.68 ± 0.479 mg/l) while highest during pre-monsoon season of 2009 (2.18 ± 1.048 mg/l) during the post monsoon season .Sachidanandamurthy and Yajurvedi (2004) have reported that decrease of BOD during post-monsoon may be due to decrease in temperature which results in decrease in microbial activity and algal bloom. The present study supports the above findings.

Chemical oxygen demand values have showed the lowest during post-monsoon season in 2008 (0.85 ± 0.071 mg/l) while highest during pre-monsoon season of 2008 (1.58 ± 0.635 mg/l). The above finding agrees with Kulasherstha and Sharma (2006). Carbon dioxide values have showed the lowest during monsoon season in 2009 (1.45 ± 0.370 mg/l) while highest during pre-monsoon season of 2008 (3.18 ± 0.718 mg/l).The values of the carbon dioxide have revealed the greater fluctuation among the various seasons of the study sites during the study period. Seasonally, free carbon dioxide was low during monsoon high during pre-monsoon season. Pinaki et al. (2007) also observed similar relationship. Chloride values have showed the lowest during pre-monsoon season in 2008, (11.78 ± 1.242 mg/l) while highest during post-monsoon season of 2009 (19.15 ± 3.121 mg/l). The values of the chloride have revealed the greater fluctuation among the various seasons of the study sites during the study period

.Similar observations were made by Sunil Kumar (2006). The total hardness values have showed the lowest during pre-monsoon season in 2009 (62.75 ± 19.050 mg/l) while highest during post monsoon season of 2009 (100.00 ± 8.287 mg/l). The values of the total hardness have revealed the greater fluctuation among the various seasons of the study sites during the study period. Similar behavior of total hardness was recorded by Khadade and Mule (2003) and Dilip Rathod et al. (2006). Calcium values have showed the lowest during pre-monsoon season in 2009 (13.00 ± 0.781 mg/l) while highest during monsoon season of 2009 (15.15 ± 1.725mg/l). Magnesium values have showed the lowest during pre-monsoon season in 2008 (12.95 ± 1.075 mg/l) while highest during post-monsoon season of 2009 (20.65 ± 1.928 mg/l). Similar observation was made by Mawhoob (2009). Total alkalinity values have showed the lowest in monsoon 2008 (32.00 ± 6.218 mg/l) an highest values during pre-monsoon season in 2009 (57.25 ± 36.972 mg/l). Similar finding was made by Srivastava and Patil (2002). Phosphate values have showed the lowest during pre-monsoon season in 2009 (0.07 0.073 mg/l) while highest during monsoon season of 2009(0.41 ± 0.210 mg/l). Similar finding were made by Rajkumar et al. (2006).

Nitrate values have showed the lowest during monsoon season in 2009 (0.14 ± 0.029 mg/l) while highest during pre-monsoon season of 2009 (0.26 ± 0.134 mg/l).Nitrate peaks were observed during monsoon season in all waterbodies. In the pre-monsoon the concentration of nitrate decreased which is due to the nutrient demand of the growing plankton. Similar results were observed by Mawhoob (2009). Nitrite values have showed the highest during pre-monsoon season in 2008 (0.002 ± 0.001 mg/l). If seasonal variations are taken into consideration, higher values are recorded during post-monsoon season and lower values of nitrate recorded during monsoon season (0.001 ± 0.001 mg/l).Similar findings were made by Sunil Kumar (2006). Sulphate values have showed the lowest during monsoon season in 2008 (3.63 ± 0.126 mg/l), while highest during post-monsoon season of 2009.(22.30 ± 8.490 mg/l). Similar finding were made by Shiddamallayya and Pratima (2008). Sodium values showed the minimum value during monsoon season of 2008 (2.78 ± 0.427 mg/l) while the highest value was recorded in pre-monsoon season of the year 2009 (3.70 ± 2.269 mg/l).Similar observations are in conformity with the work of Mawhoob (2009).

Potassium values have showed the lowest during monsoon season in 2009 (1.50 ± 0.294 mg/l) and highest (2.20 ± 1.585 mg/l) in 2008. Similar findings are made by Basavaraja (2009). Organic matter values have showed the lowest during monsoon season in 2009, (1.36 ± 0.350 mg/l) while highest during monsoon season of 2008 (2.50 ± 0.469 mg/l). Shiddamallayya and Pratima (2008) have also recorded DOM concentration high during post-monsoon and low in pre-monsoon. The minimum concentration of DOM recorded during pre-monsoon season due to eutrophication in the water bodies while high values recorded during post-monsoon due to increase biodegradation and accumulation of organic matter in the water bodies. Similar, observation was made by Agarkar and Garode (2001) and Indra and Sivaji (2006). Iron values have showed the lowest during post-monsoon season in 2009 (0.11 ± 0.037 mg/l) while highest during pre-monsoon season of 2009 (0.22 ± 0.071 mg/l) Panda et al. (2004) have recorded high value of iron during monsoon season. Silica values have showed the lowest (0.49 ± 0.053 mg/l) and highest (0.28 ± 0.108 mg/l) values during monsoon seasons of the study period .The highest content was during pre-monsoon season due to death and decomposition of diatoms. Similar observation has been made by Govindasamy et al. (2000). The natural silica concentration of freshwater most commonly ranges from 1–30 mg/l (Wetzel, 2001).

All the hydrological and physicochemical parameter studied showed noticeable seasonal variation. The Karl Pearson’s correlation coefficient of Koramagudda kere was calculated among the physico-chemical properties of the water and are represented in Table 2 . The air temperature of the wetland has showed the significant positive relationship with the water temperature and COD, while negatively with the dissolved oxygen, chloride, total hardness, magnesium, total acidity, nitrites and sodium concentration. The water temperature of the study site has revealed the significant negative relationship with the dissolved oxygen, total hardness, magnesium, total alkalinity, nitrites, sodium and potassium, while positively with the COD concentration. The pH has exhibited the significant negative relation with the dissolved oxygen of the water. The electrical conductivity of the water has revealed the significant positive relationship with the total dissolved solids, BOD, COD, total alkalinity and sulphates, while negative relationship with the phosphate and silica concentration. The total dissolved solids in turn exhibited positive relationship with the BOD, COD, total alkalinity and sulphates, while negative relationship with the dissolved oxygen, organic matter and silica. The turbidity of the water has revealed the significant negative relationship with the carbon dioxide, total acidity and silica and positively with the phosphate concentration. The dissolved oxygen concentration has represented the positive correlation with the total hardness, calcium and magnesium and negatively with the BOD, COD and iron concentration. The BOD has represented the significant positive relationship with the COD and negatively with the organic matter and silica concentration. The COD values have represented significant negative relationship with calcium and silica concentration. The carbon dioxide concentration has revealed the significant positive relationship with the total acidity, nitrites, sodium and potassium, while negative relationship with the phosphate. The chloride concentration of the study site has revealed the significant positive relation with the total alkalinity, magnesium, total alkalinity, nitrites, sulphate and sodium concentration. The total hardness of the study site has revealed the significant positive relationship with the magnesium and negative with total acidity and iron. The calcium concentration has showed the significant negative relationship with the iron. The magnesium concentration of the study site has revealed the significant negative relationship with the total acidity and iron concentration. Total alkalinity of the wetland has revealed the significant positive relationship with the sodium concentration. The total acidity has revealed the significant positive relationship with the iron and negatively with the phosphate concentration. The nitrites have showed the significant positive relationship with the sodium and potassium. The sulphates showed the significant negative relationship with the organic matter and silica. The sodium has showed the significant positive relationship with the potassium and organic matter with the silica concentration.

Table 1. Seasonal variation of physico-chemical parameters in Koramagudda kere during 2007-2009

Para-meters	2007-08			2008-09		
	Monsoon	Post-monsoon	Pre-monsoon	Monsoon	Post-monsoon	Pre-monsoon
	Mean ± Sd (Min - Max)	Mean ± Sd (Min - Max)	Mean ± Sd (Min - Max)	Mean ± Sd (Min - Max)	Mean ± Sd (Min - Max)	Mean ± Sd (Min - Max)
AT	26.75 ± 0.957 (26 - 28)	23.67 ± 1.155 (23 - 25)	28.50 ± 5.196 (22 - 34)	26.00 ± 2.160 (24 - 29)	22.50 ± 2.082 (20 - 25)	27.00 ± 3.559 (22 - 30)
WT	24.25 ± 0.957 (23 - 25)	20.67 ± 1.155 (20 - 22)	25.25 ± 3.862 (20 - 29)	24.50 ± 1.915 (23 - 27)	21.00 ± 1.633 (19 - 23)	24.50 ± 3.109 (20 - 27)
pH	7.15 ± 0.238 (7 - 7.5)	7.23 ± 0.101 (7.14 - 7.34)	7.34 ± 0.237 (7.04 - 7.61)	7.21 ± 0.189 (7.09 - 7.49)	7.21 ± 0.083 (7.11 - 7.31)	7.41 ± 0.249 (7.12 - 7.7)
EC	53.00 ± 8.042 (48 - 65)	62.67 ± 1.528 (61 - 64)	69.75 ± 5.123 (65 - 77)	62.75 ± 6.238 (56 - 71)	74.00 ± 6.377 (65 - 79)	77.00 ± 7.165 (70 - 85)
TDS	31.26 ± 3.783 (27.72 - 36.6)	36.11 ± 0.978 (35.04 - 36.96)	42.39 ± 1.292 (41.52 - 44.28)	39.91 ± 4.010 (35.84 - 45.44)	41.61 ± 3.615 (36.6 - 44.56)	45.28 ± 4.748 (39.8 - 50.4)
Tur	9.06 ± 1.252 (7.5 - 10.5)	4.07 ± 0.306 (3.8 - 4.4)	8.08 ± 4.251 (4.5 - 13.1)	18.70 ± 2.889 (15.3 - 22.3)	10.60 ± 1.851 (9.1 - 13.3)	6.80 ± 1.881 (4.4 - 8.3)
DO	7.15 ± 1.389 (5.1 - 8.1)	8.70 ± 1.153 (7.5 - 9.8)	5.23 ± 1.315 (4.1 - 7.1)	6.48 ± 1.245 (4.9 - 7.9)	7.95 ± 1.147 (6.3 - 8.9)	4.60 ± 0.535 (4 - 5.3)
BOD	0.76 ± 0.230 (0.5 - 1)	0.68 ± 0.479 (0.4 - 1.23)	2.18 ± 1.121 (1.11 - 3.2)	2.23 ± 0.499 (1.8 - 2.9)	1.18 ± 0.499 (0.8 - 1.9)	2.18 ± 1.048 (1.2 - 3.6)
COD	0.98 ± 0.096 (0.9 - 1.1)	0.85 ± 0.071 (0.8 - 0.9)	1.58 ± 0.635 (1.19 - 2.31)	1.10 ± 0.058 (1.02 - 1.16)	0.97 ± 0.059 (0.9 - 1.01)	1.25 ± 0.054 (1.18 - 1.31)
CO_2	1.70 ± 0.258 (1.4 - 2)	3.33 ± 0.404 (3.1 - 3.8)	3.18 ± 0.718 (2.3 - 3.9)	1.45 ± 0.370 (1.1 - 1.9)	2.23 ± 0.472 (1.8 - 2.9)	2.63 ± 0.954 (1.2 - 3.2)
Cl^-	13.50 ± 1.633 (11.9 - 15.1)	13.03 ± 0.231 (12.9 - 13.3)	11.78 ± 1.242 (10.9 - 13.6)	13.48 ± 1.457 (11.6 - 14.9)	19.15 ± 3.121 (16.1 - 23.1)	16.05 ± 4.792 (11.2 - 21.1)
TH	62.00 ± 7.071 (53 - 70)	77.00 ± 6.000 (71 – 83)	59.50 ± 9.678 (49 - 72)	91.50 ± 12.793 (73 - 101)	100.00 ± 8.287 (91 - 111)	62.75 ± 19.050 (46 - 83)
Ca	14.03 ± 0.690 (13.1 - 14.6)	14.90 ± 0.656 (14.3 - 15.6)	12.95 ± 1.075 (11.6 - 14)	14.20 ± 1.435 (13.8 - 21.1)	15.15 ± 1.725 (18.7 - 23.3)	13.00 ± 0.781 (12.5 - 13.9)
Mg	11.65 ± 1.572 (9.7 - 13.5)	15.10 ± 1.353 (13.7 - 16.4)	11.33 ± 2.243 (8.9 - 14.1)	18.80 ± 3.405 (12.9 - 16.2)	20.65 ± 1.928 (13.8 - 17.6)	12.13 ± 4.574 (8.1 - 16.8)
TA	32.00 ± 6.218 (25 - 39)	44.00 ± 7.211 (36 - 50)	43.25 ± 9.394 (31 - 52)	44.25 ± 5.377 (39 - 51)	56.25 ± 23.400 (41 - 91)	57.25 ± 36.972 (19 - 100)
T. Aci	5.80 ± 0.374 (5.3 - 6.2)	6.40 ± 0.624 (5.9 - 7.1)	7.07 ± 2.658 (4.3 - 9.6)	3.50 ± 0.589 (2.9 - 4.1)	4.40 ± 1.997 (2.9 - 7.3)	8.40 ± 1.621 (6.3 - 10.1)
PO_4	0.30 ± 0.196 (0.09 - 0.56)	0.18 ± 0.042 (0.13 - 0.21)	0.11 ± 0.017 (0.09 - 0.13)	0.41 ± 0.210 (0.17 - 0.68)	0.19 ± 0.075 (0.11 - 0.29)	0.07 ± 0.073 (0.01 - 0.16)
NO_3	0.16 ± 0.013 (0.14 - 0.17)	0.24 ± 0.031 (0.21 - 0.27)	0.21 ± 0.148 (0.08 - 0.35)	0.14 ± 0.029 (0.1 - 0.17)	0.24 ± 0.089 (0.16 - 0.36)	0.26 ± 0.134 (0.11 - 0.41)
NO_2	0.001 ± 0.001 (0 - 0.001)	0.002 ± 0.000 (0.002 - 0.002)	0.002 ± 0.001 (0 - 0.003)	0.001 ± 0.001 (0 - 0.001)	0.001 ± 0.001 (0 - 0.001)	0.001 ± 0.001 (0 - 0.002)
SO^4	3.63 ± 0.126 (3.5 - 3.8)	3.87 ± 0.379 (3.6 - 4.3)	11.23 ± 8.646 (3.6 - 19.3)	11.73 ± 3.860 (8.1 - 17.1)	22.30 ± 8.490 (11.1 - 31)	8.95 ± 7.145 (3.9 - 19.3)
Na	2.78 ± 0.427 (2.3 - 3.3)	3.80 ± 0.265 (3.6 - 4.1)	3.38 ± 2.037 (1.5 - 5.6)	3.23 ± 0.538 (2.6 - 3.9)	4.05 ± 0.929 (3.1 - 5.3)	3.70 ± 2.269 (1.7 - 6.3)
K	1.50 ± 0.432 (1.1 - 2.1)	2.63 ± 0.416 (2.3 - 3.1)	2.20 ± 1.585 (0.8 - 3.9)	1.50 ± 0.294 (1.1 - 1.8)	1.73 ± 0.556 1.2 - 2.3)	1.73 ± 1.021 (0.9 - 3.1)
OM	2.50 ± 0.469 (1.9 - 3)	1.97 ± 0.351 (1.6 - 2.3)	1.60 ± 0.899 (0.91 - 2.9)	1.36 ± 0.350 (0.95 - 1.7)	1.37 ± 0.490 (1.11 - 2.1)	1.90 ± 0.631 (1.09 - 2.6)
Fe	0.19 ± 0.042 (0.13 - 0.23)	0.09 ± 0.071 (0.009 - 0.15)	0.18 ± 0.043 (0.13 - 0.23)	0.13 ± 0.031 (0.1 - 0.17)	0.11 ± 0.037 (0.08 - 0.16)	0.22 ± 0.071 (0.13 - 0.29)
Si	0.49 ± 0.053 (0.41 - 0.53)	0.47 ± 0.036 (0.43 - 0.5)	0.36 ± 0.098 (0.22 - 0.45)	0.28 ± 0.108 (0.15 - 0.41)	0.30 ± 0.082 (0.19 - 0.39)	0.36 ± 0.075 (0.29 - 0.45)

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

Table 2. Correlation coefficient of physico-chemical characteristics of water in Koramagudda kere, 2007-2009

	WT	pH	EC	TDS	TUR	DO	BOD	COD	CO_2	Cl^-	TH	Ca	Mg	TA	T. Aci	PO_4	NO_3	NO_2	SO_4	NA	K	OM	Fe	Si
AT	**0.965**	0.353	-0.100	-0.024	0.126	**-0.593**	0.399	**0.602**	-0.236	**-0.586**	**-0.636**	-0.467	**-0.624**	**-0.559**	0.011	-0.210	**-0.549**	0.(a)	-0.194	**-0.666**	**-0.519**	-0.154	0.257	0.123
WT		0.258	-0.123	-0.020	0.251	**-0.591**	0.420	**0.522**	-0.346	-0.493	**-0.551**	-0.406	**-0.539**	**-0.542**	-0.063	-0.105	**-0.530**	0.(a)	-0.155	**-0.604**	**-0.523**	-0.163	0.262	0.077
pH			0.422	0.415	-0.097	**-0.532**	0.340	0.374	0.156	-0.305	-0.339	-0.222	-0.339	0.031	0.279	-0.468	-0.243	0.(a)	0.186	-0.442	-0.476	-0.043	0.282	-0.079
EC				**0.951**	-0.048	-0.464	**0.536**	**0.517**	0.303	0.425	0.079	-0.103	0.098	**0.526**	0.328	**-0.565**	0.405	0.(a)	**0.607**	0.337	0.087	-0.434	0.090	**-0.686**
TDS					0.096	**-0.571**	**0.683**	**0.531**	0.261	0.324	0.058	-0.139	0.078	**0.537**	0.308	-0.482	0.337	0.(a)	**0.585**	0.327	0.092	**-0.505**	0.114	**-0.722**
TUR						-0.113	0.452	0.170	**-0.692**	-0.009	0.470	-0.020	0.486	-0.022	**-0.653**	**0.557**	-0.473	0.(a)	0.336	-0.228	-0.454	-0.470	-0.196	**-0.580**
DO							**-0.736**	**-0.635**	-0.037	0.197	**0.583**	**0.648**	**0.553**	-0.083	-0.482	0.436	0.203	0.(a)	-0.065	0.187	0.234	0.263	**-0.646**	0.364
BOD								**0.686**	0.036	0.070	-0.060	-0.387	-0.027	0.379	0.143	-0.149	-0.105	0.(a)	0.399	0.041	-0.169	**-0.629**	0.111	**-0.641**
COD									0.089	-0.226	-0.310	**-0.587**	-0.273	0.035	0.112	-0.305	-0.187	0.(a)	0.298	-0.259	-0.290	-0.350	0.240	**-0.544**
CO_2										0.115	-0.189	0.060	-0.194	0.439	**0.689**	**-0.500**	**0.590**	0.(a)	-0.075	**0.521**	**0.689**	0.032	-0.003	0.165
Cl^-											**0.537**	0.383	**0.540**	**0.704**	0.118	-0.022	**0.544**	0.(a)	**0.530**	**0.677**	0.282	-0.255	-0.237	-0.319
TH												0.498	**0.998**	0.410	**-0.601**	0.494	0.168	0.(a)	0.457	0.355	0.070	-0.354	**-0.649**	-0.356

Ca													0.445	0.119	-0.302	0.166	0.327	0.(a)	0.282	0.273	0.185	0.081	**-0.592**	0.191
Mg														0.424	**-0.594**	0.495	0.167	0.(a)	0.453	0.363	0.070	-0.377	**-0.632**	-0.387
TA															0.381	-0.051	0.468	0.(a)	0.444	**0.705**	0.367	-0.316	-0.086	-0.397
T. Aci																**-0.560**	0.427	0.(a)	-0.182	0.331	0.412	0.216	**0.584**	0.154
PO_4																	-0.248	0.(a)	-0.082	-0.039	-0.102	0.067	-0.309	0.052
NO_3																		0.(a)	0.068	**0.834**	**0.762**	0.142	-0.070	-0.036
NO_2																		0.(a)	0.(a)	0.(a)	0.(a)	0.(a)	0.(a)	0.(a)
SO_4																				0.123	-0.232	**-0.516**	-0.299	**-0.611**
NA																					**0.836**	-0.134	-0.179	-0.221
K																						0.069	-0.092	0.064
OM																							0.392	**0.600**
Fe																								0.011

Bold letters indicates significant at the 0.05 level.

Conclusion

As the season changes there is a fluctuation in the physicochemical characters of the water this will be due to in flow and change in the temperature .The wetland, we are selected for our study is perennial. The values of all the parameters analyzed during the present study are under permissible limits and water is free from pollution

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