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Comparative Study of Physico-Chemical Properties of the Lentic Ecosystem of Chhapra District (Banwari Shah Pokhara and Jatahi Pokhara)

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Abstract: ***The lentic environment involves a gradient from lakes to ponds to bogs swamps masher as small ponds have the tendency to become thermally stratified during summer and winter to undergo definite seasonal periodicity is depth distribution of heat and oxygen Light to penetrates only to a certain depth depending upon turbidity. There gradations of oxygen light and temperature profoundly influence like in the pond.***
Keyword: lentic environmental ponds thermally, light temperature oxygen seasonal.

I. INRODUCTION

The lentic environment involves a gradient from lakes to ponds to bogs swamps. marshes lakes are inland depressions containing standing water. They may vary in size from small ponds of less than area to large seas covering thousands of square miles and may range in depth from a few feet over to 5,000 feet. Ponds are considered as small bodies of standing water so shallow that rooted plants can grow over most I the bottom. The aquatic habitats of lake and pond remain vertically stratified in relation to light intensity wave length, absorption hydrostatic pressure, temperature etc. Jatahi pokhara is a natural pokhara situated about 50 m north of saddha dhala near railway line and has an everage depth about 10-15ft. Banwari shah pokhara is a man made pokhara situated near Rajendra college. Its average depth is around 20-30ft .

II. MATERIALS AND METHODS

In case of Pokharas samples were directly collected from the source. The sampling frequency was kept quarterly for a total period of over 12 month for two years Samples were collected keeping in mind that seasonal variation affected the water quality. Samples were collected in winter month , summer month pre monsoon and post monsoon period. Hence total 8 samples were collected in 24 months . Triplicate samples each of two liters in polythene bottles were collected from each collecting site and brought to the laboratory in ice boxes for the analysis of various physico-chemical parameter for the collection and analysis of various water quality parameters standers method such as Adoni (1985) Trivedy et al . (1987) and APHA (1989) were followed the water quality parameters such as temperature, pH, depth of visibility were recorded in the field. The temperature was recorded with help of thermometer in the field. The pH was recorded with the help of pH paper in the field and later confirmed in the laboratory with the help of pH meter. The light intensity was calculated with the help of Secchi disc in the field. Dissolved oxygen value was calculated by eudiometric titration method (Winkler method) and free carbon dioxide was obtained by titrating the water sample against strong alkali to pH 8.3 in the laboratory .The total hardness, alkalinity, total dissolved solids and turbidity were measured with EDTA method. Sulfuric acid filtration method gravimetric method and Turbid metric method respectively in the laboratory. The nitrate content were measured with the help of UV spectrometer. Sediment samples were collected in duplicate from every station twice a year for two years. Sediment samples were subjected to pipette analysis according to the standard method (Krumbein and John 1938). The percentage composition of sand slit and clay was calculated wad organic carbon was converted to organic matter. (Trask 1939) and expressed as percentage of sediment dry weight.

III. RESULT AND DISCUSSION

In present study I found that the maximum temperature were recorded 30.5 in Jatahi pokhara and minimum water temperature was recorded in Banwari shah pokhara 29.6 in summer season while in winter season. The maximum water temperature was recorded 17.6 in Jatahi pokhra and minimum temperature was recorded 16.2 in Banwari shah pokhra. Temperature is one of the most important factor in the aquatic environment. The pH value of the ponds remained higher during summers season in both the pools 7.4 in Banwari shah and 7.6 in Jatahi pokhra and lowest during 7.0 in banwari shah and 7.1 in Jatahi pokhra. The highest EC value

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was recorded (619.4) in summer season in Banwari shah while lowest in rainy season in pond Jatahi pokhra (418.9). The present study in conformity with the earlier works elsewhere (Pandey and Pandey 2003). The values of for depth of visibility of two pools were recorded minimum (98cm) during summer and maximum (122cm) during winter.

TDS was maximum in pond Banwari shah in rainy season (676.1) and minimum in winter season in pond Jatahi pokhara (548.6) .

In the present study DO was recorded maximum in pond Banwari shah in winter (3.1) and minimum in pond Jatahi pokhra (1.4) in summer season.

In the present study BOD level was highest in pond Banwari shah in summer season (76.3) and lowest in Jatahi pokhra in winter season (51.2). The maximum alkalinity was obtained in Banwari shah (358.4) in summer season where as lowest in Jatahi pokhra (240.6) in winter season.

In the present study the level of nitrate was highest in Banwari shah in rainy season (6.4) and lowest in Jatahi pokhra in winter season (2.1) phosphate was recorded maximum (3.4) in Banwari shah in rainy season and lowest in Jatahi pokhra (1.7) in winter season.

During present study maximum level of hardness was recorded in Banwari shah (599.9) in rainy season indicating water is hard.

IV. COMPARATIVE STUDY OF PHYSICO-CHEMICAL PROPERTIES OF THE LENTIC ECOSYSTEM (BANWARI SHAH POKHRA AND JATHAHI POKHRA)

A. Banwari Shah Pokhra

Parameter	Summer	Rainy	Winter
Temperature	29.6± 4.30	24.5± 2.01	16.2± 2.31
pH	7.4± 0.91	7.0± 0.80	7.3± 0.54
Depth of visibility (cm)	98cm	120cm	122cm
EC (µscm)-1)	619.4± 50.13	52.1± 47.48	561.8± 62.38
TDS (mgl^{-1})	651.7± 58.29	676.1± 71.52	639.2± 68.09
DO ((mgl^{-1})	1.4± 0.08	1.9± 0.12	3.1± 0.11
Alkalinity (mgl^{-1})	358.4± 33.88	324.8± 35.81	299.7± 24.88
Total hardness (mgl^{-1})	580.1± 61.94	599.4± 52.52	552.2± 50.00
Total N2 +Nitrate (mgl^{-1})	6.1± 0.62	6.4± 0.81	3.9± 0.21
Phosphate (mgl^{-1})	3.0± 0.17	3.4± 0.20	2.1± 0.31
Free CO2	1.4± 0.18	1.9± 0.17	2.1± 0.61
BOD	76.3± 6.83	66.5± 7.05	53.1± 4.37

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B. Jatahi Pokhra

Parameter	Summer	Rainy	Winter
Temperature (oc)	30.5± 2.89	26.3± 3.04	17.6± 2.07
pH	7.6± 0.89	7.1± 0.58	7.2± 0.79
Depth of visibility (cm)	100cm	110cm	117cm
EC (µscm)-1)	581.7± 49.37	481.9± 42.36	503.8± 49.98
TDS (mgl^{-1})	573.5± 61.08	590.3± 52.39	548.6± 55.46
DO (mgl^{-1})	1.8± 0.19	1.9± 0.14	2.1± 0.29
Alkalinity (mgl^{-1})	28904± 23.81	250.4± 31.19	240.6± 26.19
Total hardness (mgl^{-1})	571.2± 51.47	580.9± 61.53	550.5± 49.98
Total N2 +Nitrate (mgl^{-1})	2.8± 0.26	2.4± 0.23	2.1± 0.09
Phosphate (mgl^{-1})	2.1± 0.18	2.6± 0.28	1.7± 0.21
Free CO2	1.3± 0.18	1.1± 0.71	2.9± 0.66
BOD	64.0± 5.29	57.3± 6.81	51.2± 6.89

All value are mean ± SEM of three replicates.

V. CONCLUSION

From the above study I can say that temperature is one of the most important factors in the aquatic environment because Joshi and singh (2001) observed that solubility of oxygen in the water increased when the water temperature decreases. So we can say that the temperature plays a crucial role in physico-chemical properties and biological behavior of aquatic system. The pH value is high in summer season in both ponds.

Considering all observation of water quality it is clear that during winter water is less turbid than monsoon and summer. From present study I found that BOD is the measure of the extent of pollution in the water body. The alkalinity of pond water was maximum during summer followed by monsoon and winter . The presence of the carbonate, bicarbonate, sulphate and phosphate in the pond water may be responsible for high alkalinity as well as total hardness.

The concentration of nitrate and phosphate were maximum in monsoon either due to addition of those elements from the land along with run-off water or from industrial discharge.

The overall anthropogenic impact on the ponds has resulted in the deterioration of the water quality and sediment shrinkage of pond area.

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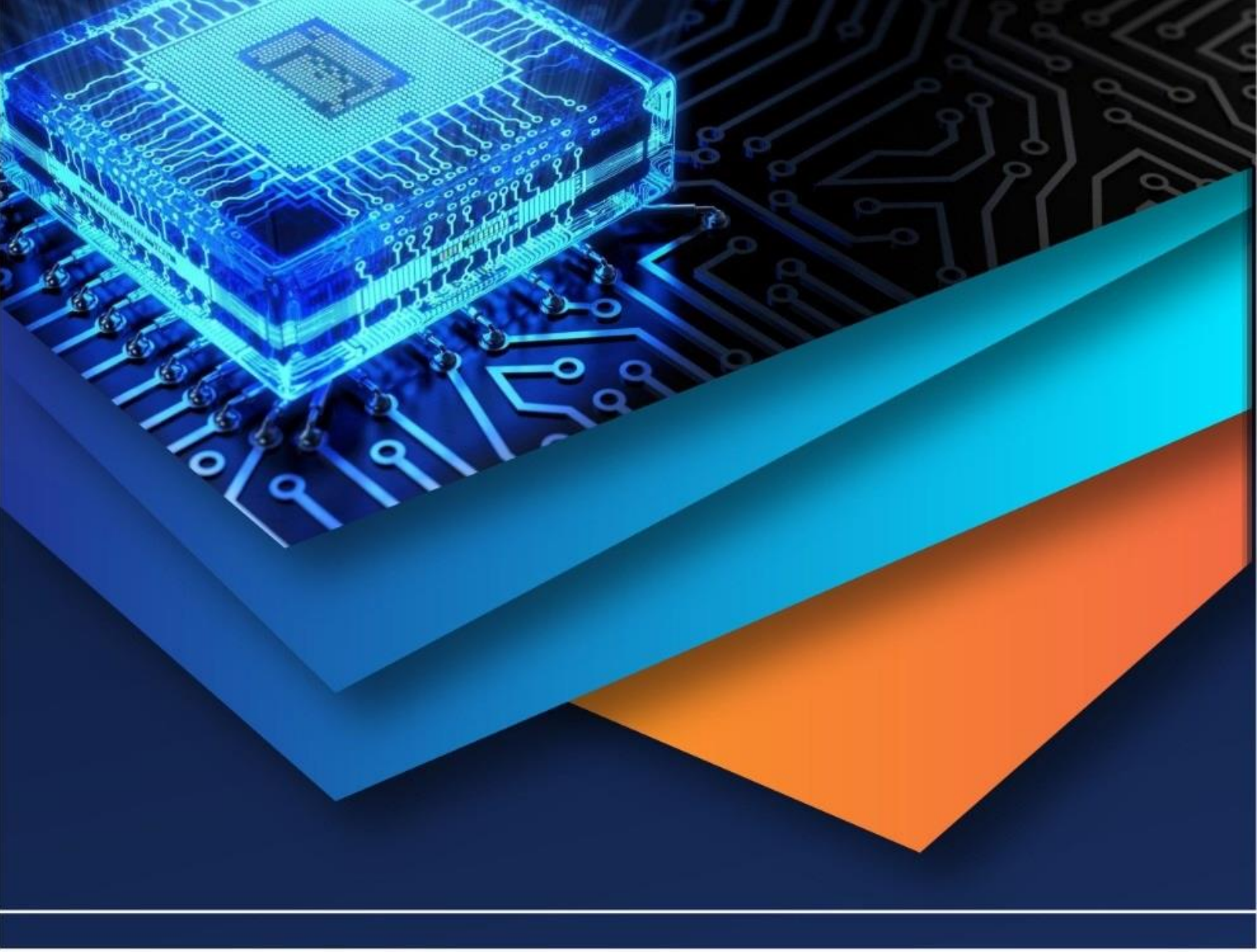

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