Study of 12 Selected Chemical Characteristics of Surface Water of Baraila Wetland, Vaishali, Bihar

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Abstract

The aim of present study is to investigate the variations in surface water configurations of Baraila lakes, Vaishali, Bihar and seek explanations for the same in the light of neotectonism in the study area, so as to understand and make predictions about surface water availability in this agricultural land. The chemical properties of Baraila lakes water body was investigated during the period of October 2009 to September 2010. The nature of sample was seasonal in three different sites (Dullour-SI, Loma- SII and DihBuchauli- SIII). These properties serve as a significant influence on aquatic biotain various ways.

KEYWORDS- Barailalakes, Wetlands, Neotectonism, Chemical property, Surface water.

INTRODUCTION

It is increasingly realized that the planet Earth is facing great environmental problems with fast depleting natural resources and threatening the very existence of most of the ecosystems. Serious concerns are voiced among scientists, sociologists, politicians and economists to conserve and preserve the natural resources of the world. Wetlands are one of the crucial natural resources. These are the areas of land that are either temporarily or permanently covered by water. This means a wetland is neither truly aquatic nor terrestrial; it is possible that wetlands can be both at the same time depending upon seasonal variability. Thus, wetlands exhibit enormous diversity according to their genesis, geographical location, water regime and chemistry, dominant plants and soil or sediment characteristics (Agarwal, 1991). The wetland atlas of Bihar, which is a part of the National Wetland Atlas of India, is an attempt in this direction (Adoni, 1985). So these wetlands support a large variety of plant and animals adapted to fluctuating water levels, making the wetlands of critical ecological significance(Cowardin et al, 1979). They support a wide range of functions that are essential for plants, animals and human life and also for maintaining the quality of environment. The direct and indirect benefits derived from them are: water storage, flood control, prevention of soil erosion, sediment trapping, water purification, nutrient cycling, aesthetic beauty and high biological diversity.

There are numerous natural and man-made problems in this regard that call for urgent attention and action(Islam et al, 2008). A detailed study of the wetlands and related channel flows, e.g. rivers meander, abandoned channels, braided streams, alluvial deposits, and other fluvial features, over time and space, require an understanding of hydro-geological framework of a region (Ahmad et al, 1995). The aim of present study is to study the variations in these surface water configurations and seek explanations for the same in the light of neotectonism in the study area, so as to understand and make predictions about surface water availability in this agricultural land.

METHODS

The Chemical properties of Baraila lakes water body during the period of October 2009 to September 2011. Some of the experiments were done at the spot while others were done in

the laboratory after fixing the samples. The following parameters were studied in the investigation:

Chemical parameters taken into consideration:

- pH
- Dissolved O_2 (DO_2)
- Free Carbon dioxide (FCO_2)
- Alkalinity (Carbonate- CO_3 and Bicarbonate- HCO_3)
- Chloride
- Phosphate
- Nitrate
- Sodium
- Potassium
- Magnesium
- Calcium

OBSERVATION TABLES:

TABLE 1: PHYSIOCHEMICAL PARAMETERS OF BARAILA WETLAND AT DILLOUR(S-1), LOMA(S-2) AND DIH BUCHAULI(S-3) OF VAISHALI DISTRICT, BIHAR DURING WINTERS.

	WINTER		
	S-1	S-2	S-3
pH	7.48 ±0.1428	7.27 ±.1468	7.29 ±0.1834
DO_2	8.03 ±0.146	5.28 ±0.146	2.89 ±0.183
FCO_2	ND	10.737 ±5.416	15.174 ±8.449
CO_3	21.607 ±1.1	4.75 ±1.096	5.2 ±0.856
HCO_3	130.9 ±5.675	405 ±67.319	243.3 ±24.25
Total alkalinity	136.66 ±6.33	405.95 ±67.34	244.86 ±24.95
Chloride	34.86 ±3.243	36.48 ±3.941	39.68 ±5.395
Sodium	16.93 ±1.066	19.41 ±1.125	24.77 ±1.469
Potassium(K^+)	1.306 ±0.071	1.5 ±0.08	1.818 ±0.115
Calcium(C^{++})	13.55 ±0.746	17.3 ±0.723	15.47 ±1.174
Magnesium	11.85 ±0.707	12.35 ±1.737	15.49 ±0.95
Phosphate	0.038 ±0.003	0.0596 ±0.002	1.14 ±0.052

TABLE 2: PHYSIOCHEMICAL PARAMETERS OF BARAILA WETLAND AT DILLOUR(S-1), LOMA(S-2) AND DIH BUCHAULI(S-3) OF VAISHALI DISTRICT, BIHAR DURING SUMMERS.

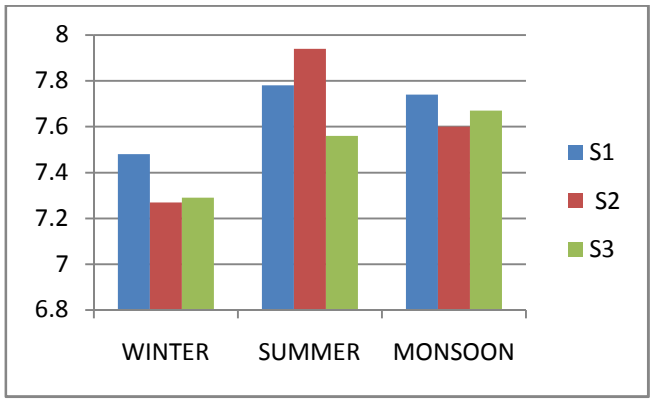
	SUMMER		
	S-1	S-2	S-3
pH	7.78 ±.1489	7.94 ±0.0686	7.56 ±0.2221
DO_2	7.3 ±0.148	5 ±0.068	3.04 ±0.222
FCO_2	ND	13.752 ±3.817	25.229 ±7.885
CO_3	22.741 ±3.581	5 ±0.089	5±ND
HCO_3	137.6 ±6.737	387.6 ±50.887	192.8 ±30.96
Total alkalinity	160.341 ±7.19	388.6 ±50.816	193.3 ±31.383
Chloride	32.58 ±3.875	33.32 ±3.383	38.32 ±3.949
Sodium	21.15 ±1.418	23.64 ±1.51	30.81 ±1.928
Potassium(K^+)	1.326 ±0.063	1.711 ±0.083	2.134 ±0.098
Calcium(C^{++})	21.21 ±1.379	26.37 ±1.251	30 ±1.518
Magnesium	14.78 ±0.871	16.27 ±1.226	17.08 ±1.022
Phosphate	0.0499 ±0.005	0.048 ±0.002	2.205 ±0.216

TABLE 3: PHYSIOCHEMICAL PARAMETERS OF BARAILA WETLAND AT DILLOUR(S-1), LOMA(S-2) AND DIH BUCHAULI(S-3) OF VAISHALI DISTRICT, BIHAR DURING MONSOONS.

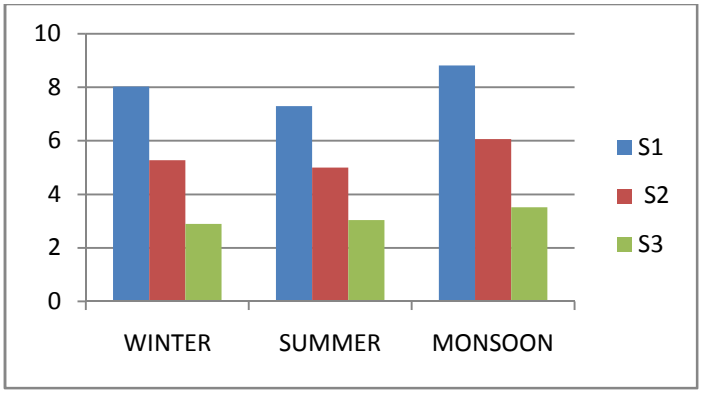
	MONSOON		
	S-1	S-2	S-3
pH	7.74 ±0.1076	7.6 ±0.0714	7.67 ±0.1437
DO_2	8.81 ±0.107	6.07 ±0.071	3.52 ±0.143
FCO_2	ND	11.559 ±3.501	19.58 ±7.345
CO_3	23.775 ±1.829	7.1 ±0.402	3 ±0.894
HCO_3	144.8 ±6.115	153.86 ±12.84	274.1 ±58.587
Total alkalinity	166.58 ±6.736	145.18 ±10.87	247.7 ±58.57
Chloride	37.03 ±4.789	40.36 ±4.218	45.11 ±5.128
Sodium	25.29 ±1.372	28.22 ±2.052	36.69 ±2.587
Potassium(K^+)	0.832 ±0.068	1.032 ±0.055	1.59 ±0.124
Calcium(C^{++})	23.76 ±1.512	29.76 ±1.512	36.68 ±1.086
Magnesium	16.73 ±0.904	17.33 ±0.592	18.45 ±0.384
Phosphate	0.0474 ±0.004	0.0608 ±0.003	4.196 ±0.728

RESULTS

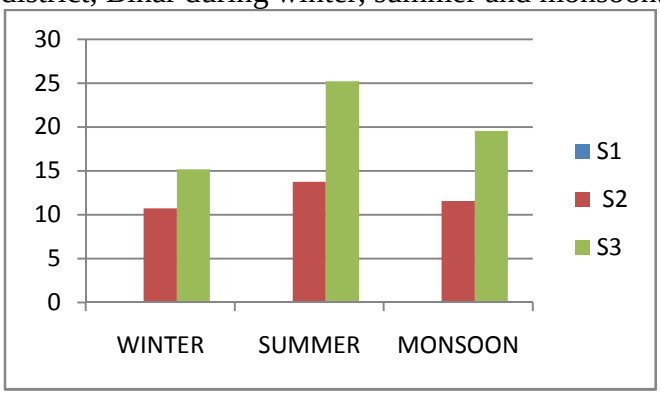
The data obtained in different quantitative estimation were processed by MS- Excel. The nature of sample was seasonal in three different sites (Dullour-S1, Loma- S2 and Dih Buchauli-S3).



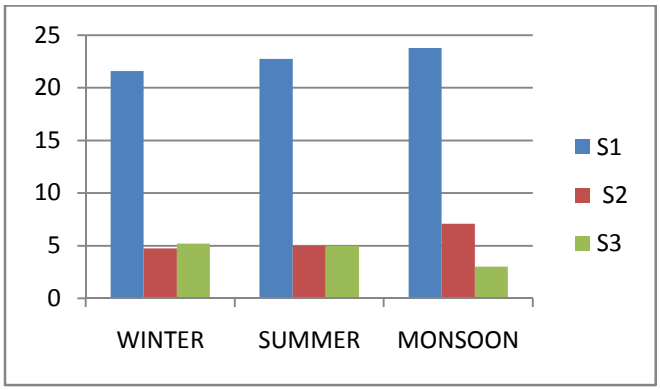
GRAPH 1: pH values of Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



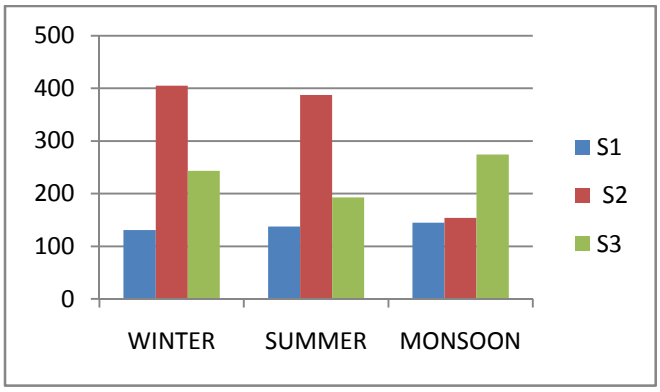
GRAPH 2: Do_2values of Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



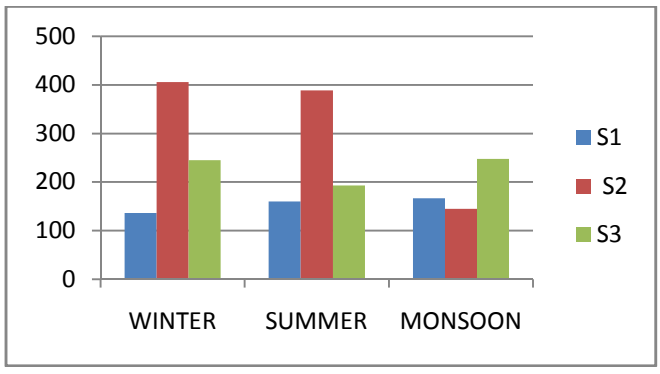
GRAPH 3: FCO_2values of Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



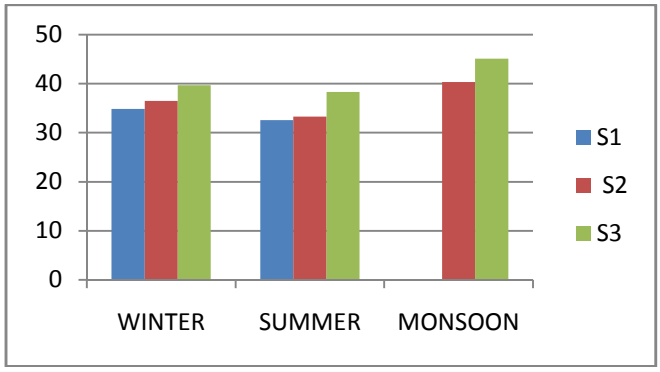
GRAPH 4: CO_3values of Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



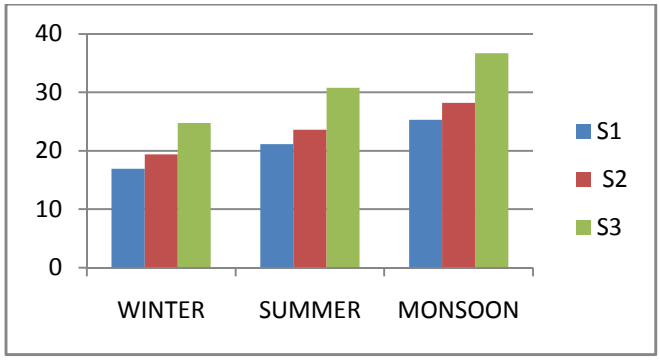
GRAPH 5: HCO_3values of Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



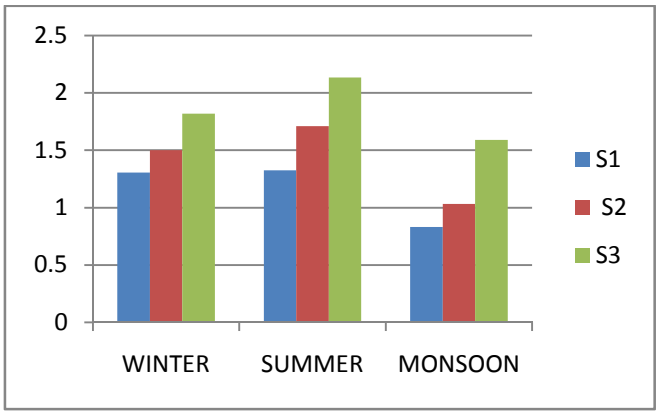
GRAPH 6: Total Alkalinity values of Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



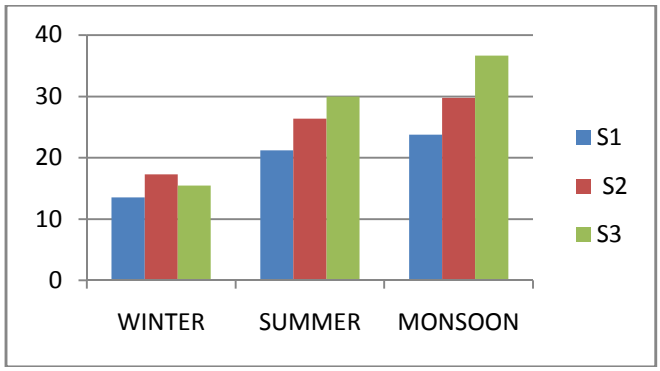
GRAPH 7: Chloride contentof Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



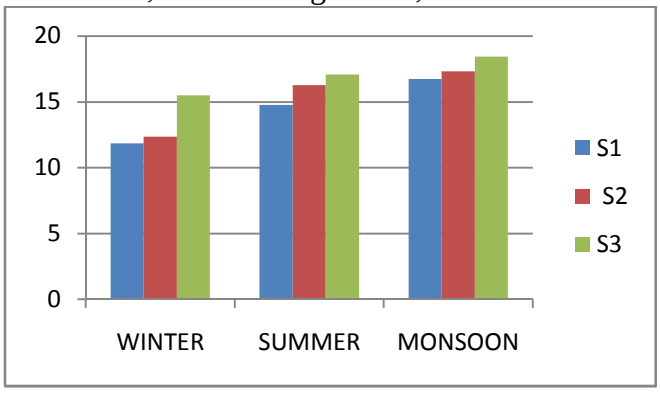
GRAPH 8: Sodium contentof Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



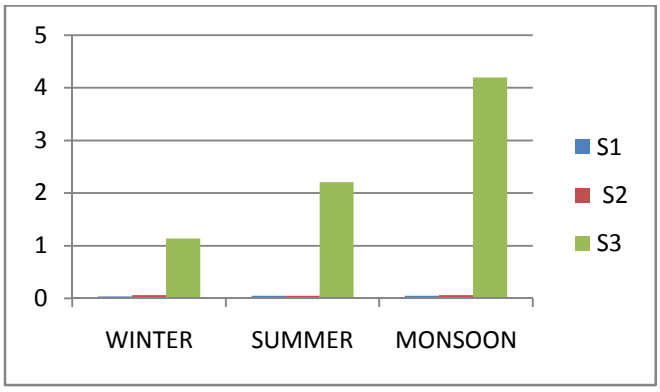
GRAPH 9: Potassium contentof Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



GRAPH 10: Calcium contentof Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



GRAPH 11: Magnesium contentof Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon.



GRAPH 12: Magnesium contentof Baraila wetland at Dillour(s-1), Loma(s-2) and DihBuchauli(s-3) of Vaishali district, Bihar during winter, summer and monsoon

DISCUSSION

- Site 1(Dillour) showed comparitively higher values for Co_2 and negligible values for Magnesium content. It's chloride content values during monsoons were not defined even though they are significant during summers and winters.
- Site 2 (Loma) showed considerably higher values for Hco3 and Alkalinity during summers and winters and both values fall down considerably during monsoons. Its magnesium content was negligible.
- Site 3 (DihBuchauli)shows significantly higher values of FCO3 and Magnesium content in all seasons.

CONCLUSION

The studied abiotic chemical factors may be used to study the types of biota in the areas and may answer questions regarding their survival and the success stories of dominant species.

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