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Seasonal Variations of Physico-Chemical Characteristics of Badopal Wetland (Water Logged Area), Hanumangarh District, North Rajasthan, India

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Abstract

The Present work deals with the study of water quality of Badopal Wetland (Water Logged Area) Hanumangarh District with regards to ten physico chemical parameters like water temperature, pH, turbidity,total alkalinity(TA),electrical conductivity(EC),Salinity, phosphate ($PO4^{3}$-) and. The physic chemical characteristic of Badopal Wetland is found to be highly fluctuated with seasonal variations during the present investigation. High value of dissolved oxygen obtained during winter months and shows inverse relation with water temperature, pH, EC, TDS, have had maximum concentrations in summer. The study revealed that the water quality is rich in, salinity,Phosphate and content which indicates that of Badopal waterlogged area is higher saline and moderately eutrophicated .That is suitable for migratory birds but high salinity damage the crop area.

Keywords: Water Quality, Wetland (Water Logged Area), Physico-Chemical Parameters, Seasonal Variations.

Introduction

Wetlands are very productive ecosystems that help in the regulation of hydrological cycles, maintenance of water quality, nutrient movement and support for food chains. Wetlands are the areas wherein water is the primary factor controlling the environment and the associated plant and animal life. Their important functions include biodiversity reserves for threatened and endangered species, nutrient recycling, purification of water and ground water recharge. (Pramod, *et al* 2011and Sarkar and Upadhyay, 2013).

Water logged area is a type of wetland and marshy lands constitute 10,851 ha or 1.12% of the total area of the Hanumangarh district and 30.30% of the total waste lands. Water logging problem has been cause due to excessive irrigation seepage from canal and lack of drainage .Indian Remote Sensing data emerged as a potential tool for monitoring salt affected soils (Khan et al.2005; Dwivedi, Sreenivas 2002; Dwivedi et al. 1999; Mougenot et al. 1993) Visual interpretation of the IRS data was used to delineate salt affected and waterlogged soils (Sharma et al.2000; Sharma and Bhargava 1988; Sujatha et al.2000). Water logging was first seen in areas of Badopal & Manaktheri in the year 1978.

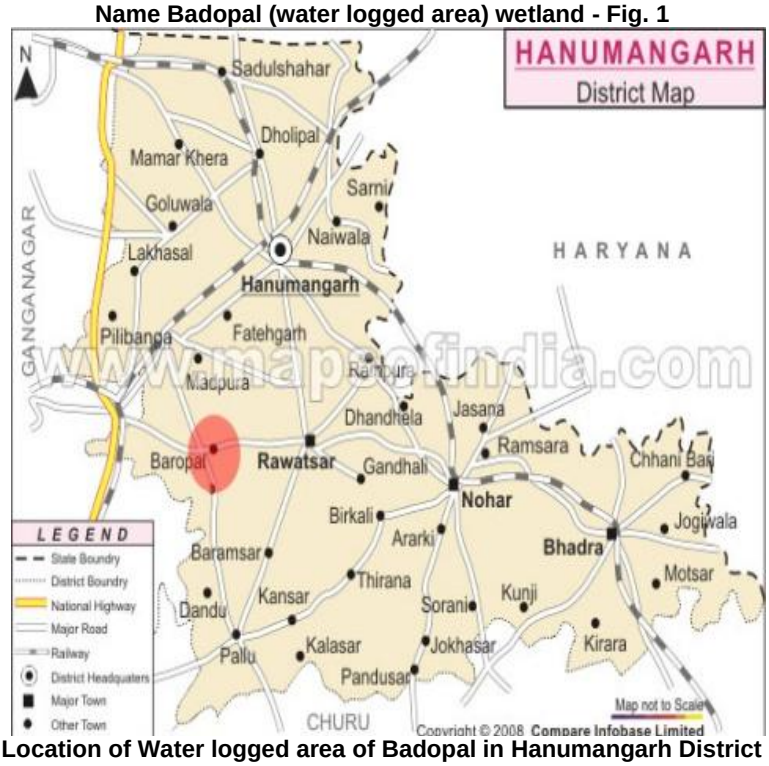
Material and Methods

Study Area

Hanumangarh is a city in North Rajasthan, and Badopal is situated in Hanumangarh District. These depression are used to store excess flood water of Ghagger river. But Badopal covered 3 to 4 Kilometer area of waterlogged problem in Hanumangarh District. These waterlogged area affected from Salinity/ Alkalinity problem.In this research work Climate is divided into three seasons,Summer (March –June), rainy (July – October) and winter (November – February). Salinity is one of the most important problems of this wetland (Water logged) . So Badopal lake is also known as Salt Lake.

Location 29*21'30" N Latitude
74*4'49"E Longitude
Wetland Type Waterlogged (Natural)
Wetland Area 3 to 4 Km
Overall Tubidity Normal

Name Badopal (water logged area) wetland - Fig. 1



Location of Water logged area of Badopal in Hanumangarh District

Sampling Methods

The water samples were collected from Badopal wetland at monthly intervals from April 2015 to March 2016 during 8.00 – 10.00 am in fresh unsullied plastic bottles. Several physico chemical parameters such as, water temperature, pH, turbidity, , total alkalinity (TA), electrical conductivity, Salinity, phosphate **($PO4^{3}$-)** and has been analyzed. In which water temperature, pH, DO were determined in the field itself.

Analysis of Water Quality Parameters

Water temperature is measured *in situ* by using hand mercury thermometer, pH was estimated by Digital pH –meter (Systronics Type-335). Turbidity was measured by Water Analyzer, Turbidity meter, Electrical conductivity was measured by conductivity meter. (Esico Microprocessor based conductivity meter for the estimation of other parameters, water sample is brought to the laboratory. The analysis of various physico-chemical characteristics of water were done as per the standard methods given by APHA (1998) and Trivedi and Goel (1984)

Aim of the Study

The purpose of the present study is to observe water quality of Badopal wetland by physico chemical procedures and to determine the changes in water quality parameters by seasons and to find the relationship between different physico chemical parameters.

Results and Discussion

Physico-chemical parameters Badopal (Water logged area) wetland obtained during the present investigation (during April 2015 – March 2016), is presented in table.

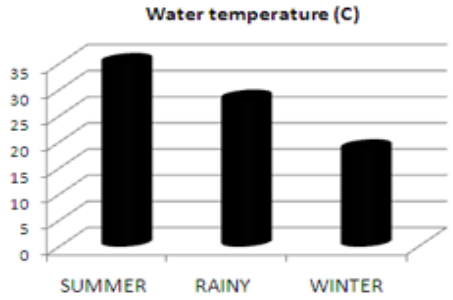
Parameter	Season		
	Summer	Rainy	Winter
Temperature	35o C.	28o C.	18.5o C.
pH	8.4	8.0	7.4
Turbidity NTU	50	44	39
EC mScm-1	45.5	43	41.3
Salinity mg/l	27,300	25.800	24,780
Total Alkalinity mg/l	180	260	330
Phosphate mg/l	4.8	6.8	4.0

Seasonal Variation of Physio-Chemical Characters of Badopal (Water Logged Area of Suratgarh) in Hanumangarh District Rajasthan (April 2015-March 2016)

Temperature

Temperature is a physical factor that alters the water characteristics and considered as an important factor in controlling the fluctuation of plantation and functioning of aquatic ecosystem .In the present investigation seasonal variability of atmospheric and water temperature have been observed. It was maximum (35*C) during summer comparatively less (28*C) during monsoon and minimum (18.5*C) during winter. This investigation is also in close conformity with the finding of Dwivedi and Pandey, 2002; Singh and Mathur,(2005). Chaturbhuj *et al*.,(2004,)

Figure No. 2

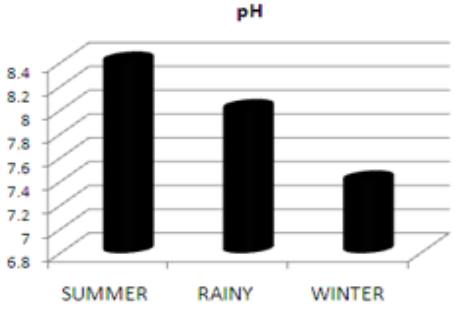


Seasonal Variation in Water Temperature of Badopal Water Logged During one Year Study Period

pH

pH determines the acidic and basic characters of water. It is a index of general environmental condition. The maximum pH value were in the month of June 8.4 and minimum in the month of December 7.4. On the whole summer period evinced higher pH8.4 than the colder season 7.4 and are related to photosynthetic activity of phytoplankton and macrophytes resulting in CO2 utilization and shifting of equilibrium between the carbonic acid and bicarbonates and mono-carbonates (Brose and Bhave, 2000, Satpathy*et al.,* 2007, Bhat, 2009 and Kumar *et al,.* 2009) Seasonal fluctuations are small indicating good buffering capacity

Figure No. 3

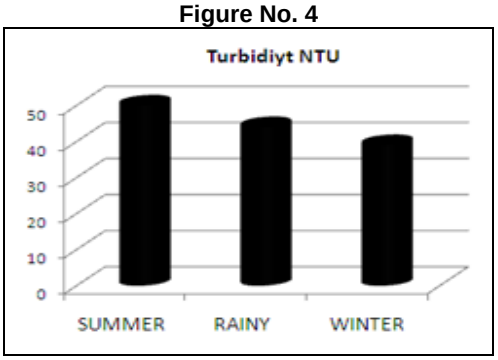


Seasonal Variation in Ph of Badopal Water Logged During One Year Study Period

Turbidity

Turbidity reduces the amount of light penetrating the water due to the presence of various suspended particles such as clay, silt, plankton, algae, etc. In the present investigation, turbidity revealed a wide range of variation with a minimum of 39 NTU and that of maximum of 50 NTU. the turbidity of water was found maximum during the summer season and least turbidity was obtained during winter figure-4. Similar findings have been projected by offem *et al.* (2011) and Tamrakar and Raj8(2013).

Figure No. 4

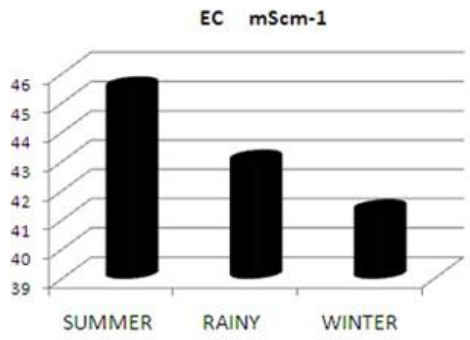


Seasonal Variation in Turbidity of Badopal Water Logged During one year Study Period

Electrical Conductivity

Electrical conductivity of the water depends on the nature and concentration of salts. In the present study high values of conductivity, could be due to high ionic concentration. The range of electrical conductivity in the present study was between 45.5 mScm-1 and 41.3 mScm-1. The values of electrical conductivity showed marked seasonal variation being maximum during rainy followed by summer and minimum during winter season. Similar results were observed by various workers (Datta and Bhagwati, 2007; Hulyal and Kaliwal, 2011; Ramulu. and Benarjee, 2013).

Figure No. 5

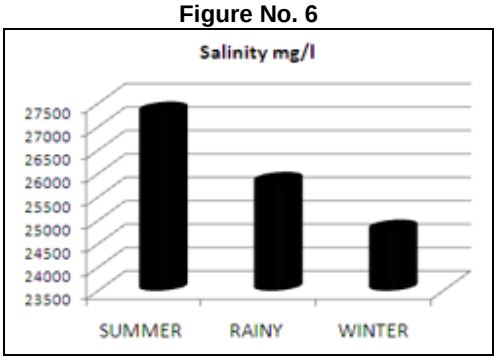


Seasonal Variation in Electrical Conductivity of Badopal Water Logged During one year Study Period

Salinity

Salinity is the saltiness or dissolved salt content of a body of water Salinity is an important factor in determining many aspects of the chemistry of natural waters and of biological processes within it.in the present investigation the maximum salinity 27300 mg/l observed in summer season and minimum salinity 24780 mg/l observed in winter season. (Verma et al., 2012). Increased high concentration of Salinity increases the nutrient status of water body which was resulted into eutrophication of aquatic bodies (Singh and Mathur, 2005).

Figure No. 6

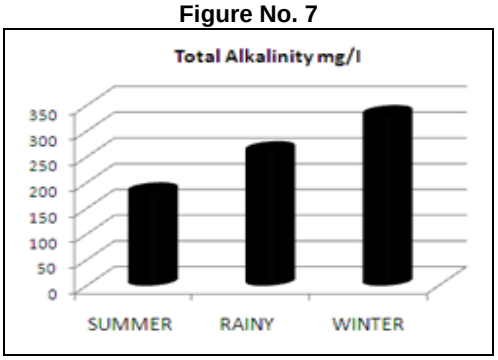


Seasonal Variation in Salinity of Badopal Water Logged During one year Study Period

Total Alkalinity (TA)

Total alkalinity is imparted by presence of bicarbonate, carbonate and hydroxide and less frequently in wetland by borate, silicate and phosphate. Total alkalinity obtained in the range of 180 mg/L to 330 mg/l. in the present investigation. The highest value shows during the winter months and lowest in the summer months. Similar trend was reported by Dhembare (2011).

Figure No. 7



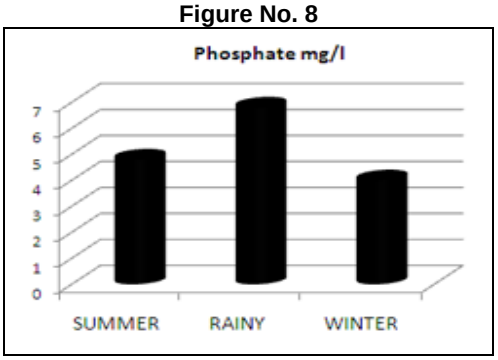
Seasonal Variation in Alkalinity of Badopal Water Logged During one year Study Period

Phosphate (PO4---)

Phosphate is the key nutrient also causing eutrophication leading to extensive algal growth. Data from the observation showed that maximum amount of phosphate present in monsoon season and declined in Summer season in the year. The seasonal mean of the year 6.8 mg/l to 4.8mg/l

The overall high concentration ofPhosphate nutrientsin the waterlogged area during autumn and winter may be as a result of the bird droppings as well since these wetlands are visited by large number of migratory water fowls, ducks and geese that arrive in autumn and reside till the end of winter is also supported by Fleming and Fraser (2001), Sathya and Sharma (2009), Zuber and Sharma (2007) and Parray*et al.* (2010).

Figure No. 8



Seasonal Variation in Phosphate of Badopal Water Logged During one year Study Period

Conclusion

From the present study it is observed that seasonal variation has highly influenced on the physic-chemical characteristic of water. Data of alkalinity and dissolved oxygen showed the favourable environment of water for aquatic life though it is not useful for drinking, irrigation and any culture purpose. High Concentration of TDS, Salinity, , Phosphate, Nitrate value indicate that the waterlogged is moderately eutrophicated that is suitable for migratory birds. All value of waterlogged area cross permissible value of (WHO).

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References

1. Pramod.A, Kumara.V and Gowda.R (2011): A Study on Physico-Chemical Characteristics of Water in Wetlands of Hebbe Range in Bhadra Wildlife Sanctuary, Mid-Western ghat Region, India. Journal of Experimental Sciences, 2(10) 09-15.
2. Sarkar.A and Upadhyay.B (2013): Assessment of the Variations in Physico-Chemical Characteristics of Water Quality of the Wetlands in District Manipuri (U.P.) India. International Journal of Geology, Earth and Environmental Sciences, 3 (1) 95-103.
3. Offem B.O., Ayotunde E.O., Ikpi G.U., Ochang S.N. and Ada F.B., Influence of seasons on water quality, abundance of fish and plankton species of Ikwori lake, South-Eastern Nigeria, Fisheries and Aquaculture, 201,FAJ-13 (2011).
4. Tamrakar C.S. and Raj S.P., Physico-chemical Assessment of Deep Groundwater Quality of Various Sites of Kathmandu Metropolitan City, Nepal, Res. J. Chem. Sci., 3(8), 78-82 (2013).
5. Dhembare A.J., Statistical approaches for computing diversity and density of zooplankton with water factors in Mula Dam, Rahuri, MS, India, Eur.J. Exptl. Bio.,1(2), 68- 76 (2011).
6. Kaur H., Bath K.S., Mandar G. and Jerath N., Physicochemical status of Kanjli wetland (Punjab-India), Journal of Environment and pollution, 7(1), 39-42
7. Bhat (2009). Limnological Characterization of Lake Tso Moriri, Ladakh. Ph.D. University of Kashmir (2000)
8. Brose S. K., and Bhave P.V. (2000). Seasonal temperature variations and their influence on levels of Diss.CO2 and pH in a river water Jalgaon. Asian Journal of Microbiology, Biotechnology & Environmental Science. 2(3&4):159-163.
9. Satpathy K. K., Prasad M. V. R., Sheela Shanta A., BhaskerS., JebaKumar K. E., Rajan M. and Arulsamy K. S. (2007). A comparison of water qualityof two freshwater sources at Kalpakkam.Proceedings of NSL-2007. 140-144.
10. Kumar A., Sharma L. L. and Aery N. C. (2009). Physico chemical characteristics and diatom diversity of JawaharSagar Lake. A wetland of Rajasthan.SarovarSaurabh. 5(1):8-14
11. Dwivedi,R.S Sreenivas,K., & Ramana, K.V. (1999). Inventory of salt affected soil and waterlogged areas : a Remote Sensing approach. International journal of Remote Sensing, 20 (8), 1589-1599.
12. Mougenot,B., pouget, T.M., & Epema, G.F. (1993). Remote Sensing of salt affect soil. Remote Sensing Reviews .7, 241-259.
13. Sharma, R.C., & Bhargava , G.P.(1988). Landsat imagery for mapping saline soil and wetland of North- West India . International journal of Remote Sensing .9, 39-44.
14. Sharma, R.C., Saxena, R.C., & Verma K.S.(2000). Reconnaissance mapping and management of salt affecting soil using satellite image. International journal of Remote Sensing . 21(17), 3209-3218.
15. Sujatha. G., Dwivedi. R.S., Sreenivas,K., & Venkatratnam,L. (2000). Mapping and monitoring of degraded land in part of jaunpur district of Uttar Pradesh using temporal spaceborne multispectral data .International journal of Remote Sensing .21(3) 519-531.
16. Khan,N.M.,Rastoskuve,V.V.,Sato,Y.,& Shiozawa ,S.(2005). Assesment of hydro- saline land degradation by using a simple approach of Remote Sensing Indicators. Agriculture Water Management. 77(1-3), 96-109.
17. Fleming R. and Fraser P. E. H. (2001). Impact of water fowl on water quality. Ridge town college, Univ. of Guelph Ridgetown. Ontario Canada.
18. Sathya R. and Sharma P. (2009). Status of water quality in Karavetti. Journal of Basic and applied hydrobiology. 3(1&2):36-41.
19. Zuber S. M. and Sharma K. K. (2007). Water quality parameters of Mansar Lake Jammu. In society, sustainability and environment. (J.Singh Ed) ShivalikPrakashan, Delhi .pp351-357.
20. Parray S. Y., Sheeraz A and Zuber S. M. (2010). Limnological profile of a sub urban pond wetland-Chatlam, Kashmir. International Journal of Lakes and Rivers. 3(1):1-6.
21. APHA. (1998). Standard Methods for the Estimation of Water and Waste Water: 20th edition. American Public Health Association, Washington, D.C.
22. Trivedi R.K. and Goel P.K. Chemical and biological methods for water pollution studies, Envirtl.l Pub., Kard, India, 1-215, (1984)
23. Dutta O.K. and Bhagawati S., KLimnology of Ox-bow Lake of Assam, NSL, 3-8, 79, 157-165 (2007)
24. Verma P.U., Purohit A.R. and Patel N.J, Pollution Status of Chandlodia Lake Located In Ahmedabad Gujarat, IJERA, 2,1600-1606 (2012)
25. Dwivedi B. K. and Pandey G. C. (2002); Physicochemical factors and algal diversity of two ponds in Faizabad, India, Poll.Res. 21(3), 361-370.
26. Singh R.P. and Mathur P. (2005); Investigation of variations in physicochemical characteristics of a fresh water reservoir of Ajmer city, Rajesthan, Ind. J. Environ. Science, 9, 57-61.
27. Pathak N.B. and Mankodi P.C.,(2013) Hydrological status of Danteshwar pond, Vadodara, Gujarat, India, I Res. J. Environ. Sci., 2(1), 43-48 .
28. Rajashekhar A.V., A. Lingaiah, Satyanarayana Rao and Ravi Shankar Piska,(2007) The studies on water quality parameters of a minor reservoir, Nadergul, Rangareddy district Andhra Pradesh, J. Aqua. Biol., 22(1), 118-122.