A Comparative Study of Physicochemical Parameters of the Freshwater Ponds from Jodhpur, Rajasthan, India

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Abstract

A comparative study of physicochemical parameters of two freshwater bodies namely Guda Bishnoiyan Talab and Guro Ka Talab was conducted to assess the seasonal variation in pH, temperature, dissolved oxygen, free carbon dioxide, alkalinity, and hardness. The results indicated that the value of the dissolved oxygen was recorded in the range of 3.8 mg/l to 8.1 mg/l, hardness from 43 mg/l to 132 mg/l. During study period from July 2019 to June 2019, observed a great seasonal variation in the values of physicochemical parameters.

Keywords: physicochemical parameters, Guda Bishnoiyan Talab, Guro Ka Talab, seasonal variation.

Introduction

Water is very precious for every living organism on this earth. The available fresh water is hardly 0.3 % of the total water available on the earth and therefore its judicious use is imperative. In today's scenario, unplanned urbanization, rapid industrialization, and indiscriminate use of chemicals are causing heavy and varied pollution in aquatic environments leading to deterioration of water quality and depletion of aquatic fauna including fish. Ponds are important part of aquatic ecosystem. Though relatively small, ponds perform significant environment, social and economic functions, ranging from being a source of drinking water, recharging groundwater, acting sponges to control flooding, supporting biodiversity and providing livelihood. The biodiversity is needed for ecological balance and human Survival (Chivian and Bernstein, 2008), but it largely influences the climate change (Bellard, *et al*., 2012). Biodiversity conservation is necessary for inclusive and sustainable development. Ponds have been used since time immemorial as a traditional source of water supply in India. Freshwater ponds are one of the most important surface water resources for the living beings. During rainy season rainwater is stored in such ponds which are used by the local communities for domestic use. It is mainly used by the animals for the drinking purpose therefore it is necessary to check its water quality. Study of physico-chemical parameters is useful to know the water quality. There is a necessity of ecological balance for widespread biodiversity and human survival.

Review of literature

Review of literature showed that several researchers have carried out such studies in India and abroad. Singhal, *et al*. (1986) have studied the physico-chemical parameters of the freshwater body from Haryana. Unanam and Akpan (2006) studied seasonal variation in physiochemical properties with plankton diversity. Chadrapur (2007) has analysed the physicochemical parameters of Pindavani Pond of Central India. Verma, *et al*. (2012) have carried out research on water quality of Laddia dam in Sikar, Rajasthan. Bajpai, *et al*. (2013) during the rainy season studied the water quality of Lakhna Devi temple water tank, Etawah and Jain and Singh (2013) and Sharma, *et al*. (2016) studied the physico-chemical and biological properties of water body in relation to fish food organisms (plankton) and aquaculture. In the present study, an attempted to perform a comparative study of physico-chemical parameters of two water bodies of Jodhpur district in Rajasthan, India was carried out.

Material and Methods

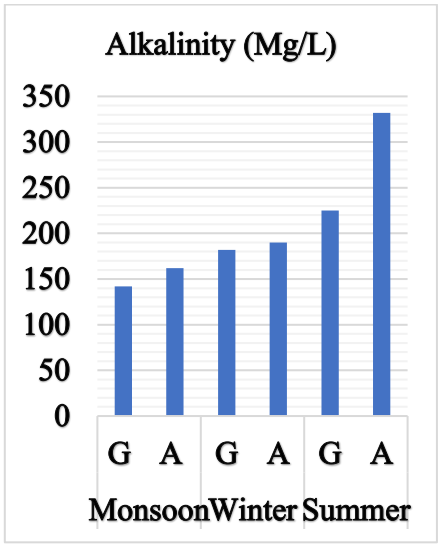
For the present study, two ponds namely Guro Ka Talab and Guda Bishnoiyan Talab were selected. The samples collected fortnightly over a period of one year from July 2018 to June 2019. Water samples were collected between 7 and 8 a.m. from the ponds studied twice in a month and physicochemical analysis was done. Temperature and pH were recorded by using a thermometer and a digital pH meter on spot. Dissolved oxygen was estimated by using Winkler's method; Free CO2, alkalinity and hardness were estimated by using standard methods APHA (2005).

Results and Discussion

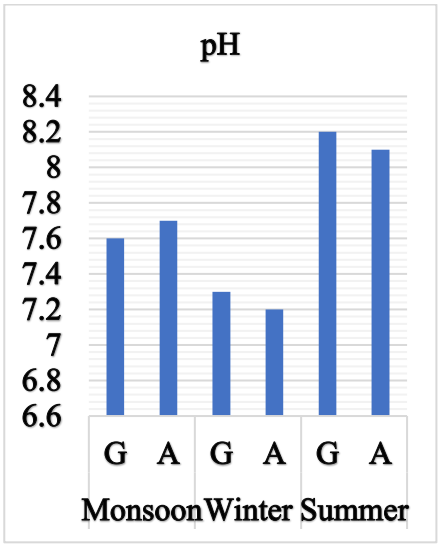
The seasonal variations in physicochemical parameters o the freshwater ponds are mentioned in Table 1. The value of dissolved oxygen was in the range from 3.8 mg/l to 6.4 mg/l Guro Ka Talab and 5.4 mg/l to 8.1 mg/l in Guda Bishnoiyan Talab. The minimum value was recorded during the summer season and the maximum during winter. The value of free carbon dioxide was in the range of 34.0 mg/l to 52 mg/l in case of Guro Ka Talab and 42 mg/l to 50 mg/l for Guda Bishnoiyan Talab. The minimum value was recorded during the monsoon season and the maximum during the summer. The value of alkalinity was recorded in the monsoon season and the maximum in the summer. The minimum value was recorded the monsoon season and the maximum during the summer. The value of alkalinity was in the range from 142 mg/l to 225 mg/l for Guro Ka Talab and 162 mg/l to 332 mg/l for Guda Bishnoiyan Talab. The minimum value was recorded in the monsoon season and the maximum in the summer. The value of hardness was in the range from 60 mg/l to 122 mg/l for Guro Ka Talab and 43 mg/l to 132 mg/l for Guda Bishnoiyan Talab. The minimum value was recorded in the monsoon season and the maximum value in the summer season. The value of temperature was in the range from 12.6 oC to 39.4 o C for Guro Ka Talab and 13.1 ºC to 38.9 ºC for Guda Bishnoiyan Talab. The minimum value was recorded in the winter season and the maximum value in the summer season. Dupuis and Hann (2009) observed that water temperature remains high in summer and lowest in winter. The pH was maximum in summer and minimum in winter. Dissolved oxygen was maximum in winter and minimum in summer. Hardness was maximum in summer and minimum in winter, maximum alkalinity in summer and minimum in winter. There is seasonal variation in physicochemical parameters in pond water. Revadekar, *et al*. (2012) observed that the water temperature was high in June and low in January. The pH was maximum in August and minimum in January. Dissolved oxygen was maximum in May and minimum in December. Carbon-dioxide was maximum in November and minimum in February, maximum alkalinity in March and minimum in July. Prasath, *et al*. (2013) also observed that there is seasonal variation in physicochemical parameters in pond water.

Table 1: Seasonal variations in the physico-chemical parameters of two ponds.

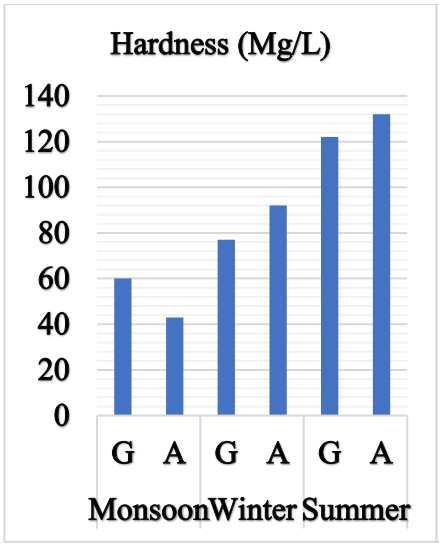
Season	Collection site	pH	Temp (ºC)	Hardness (Mg/L)	CO_2 (Mg/L)	Alkalinity (Mg/L)	D.O. (Mg/L)
Monsoon	Guro Ka Talab	7.6	32	60	34.0	142	6.4
	Guda Bishnoiyan Talab	7.7	31	43	40.2	162	6.3
Winter	Guro Ka Talab	7.3	12.6	77	35.3	182	6.6
	Guda Bishnoiyan Talab	7.2	13.1	92	42.2	190	8.1
Summer	Guro Ka Talab	8.2	39.4	122	50.2	225	5.4
	Guda Bishnoiyan Talab	8.1	41.7	132	8.20	332	3.8


Alkalinity (Mg/L)
350
300
250
200
150
100
50
0
G A G A G A
Monsoon Winter Summer

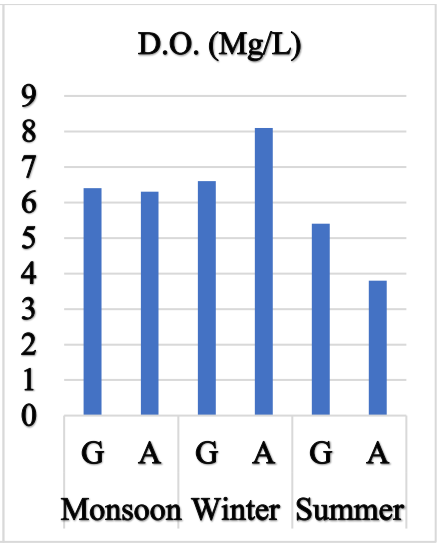
(A)


pH
8.4
8.2
8
7.8
7.6
7.4
7.2
7
6.8
6.6
G A G A G A
Monsoon Winter Summer

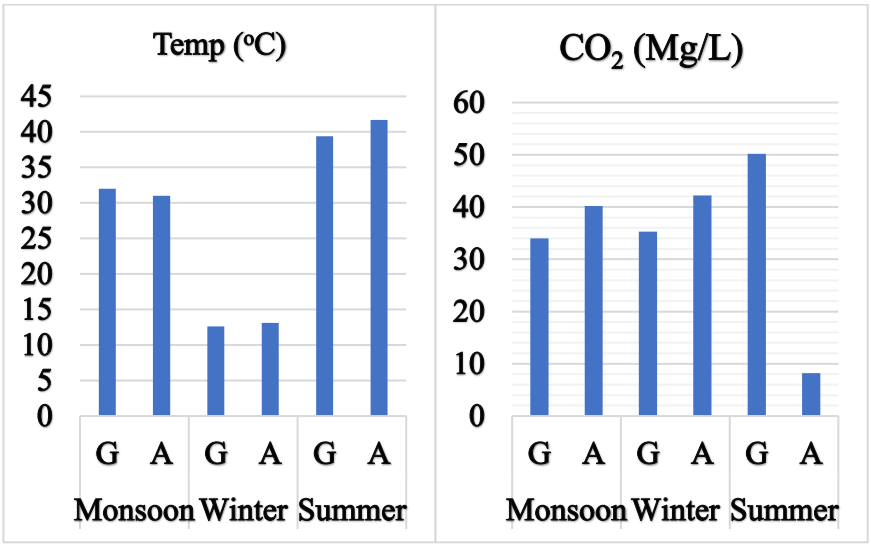
(B)


Hardness (Mg/L)
140
120
100
80
60
40
20
0
G A G A G A
Monsoon Winter Summer

(C)


D.O. (Mg/L)
9
8
7
6
5
4
3
2
1
0
G A G A G A
Monsoon Winter Summer

(D)



(E) **(F)**

(In Graphs G means Guro Ka Talab, A means Guda Bishnoiyan Talab)

Graph A: Alkalinity; Graph B: pH; Graph C: Hardness; Graph D: Dissolved Oxygen (D.O.); Graph E: Temperature; Graph F: Carbon dioxide (CO_2)

Conclusion

In the light of present findings, it can be concluded that there is a clear cut seasonal variation in physico-chemical parameters of water of experimental water bodies. After studying all the parameters, it can be concluded that the ecological condition of Guro Ka Talab is better than Gudan Bishnoiyan Talab.

References:

Bajpai, O., Mishra, S., Mohan, N., Mohan, J., & Gupta, R. K. (2013). Physico chemical characteristics of Lakhna Devi temple water tank, Lakhna, Bakewar, Etawah, UP with reference to cyanobacterial diversity. International Journal of Environment, 1(1), 20-28.

Bellard, C., Bertelsmeier, C., Leadley, P., THuiller, W., and Courchamp, F. (2012). Impacts of Climate Change on the Future of Biodiversity. Ecology Letters, 15(4), 365-377.

Chandrapur, B. D. (2007). Seasonal Variations In The Physico-chemical Parameters Of Pindavani Pond Of Central India. Journal DOI, 10, 2321-7871.

Chivian, E., and Bernstein, A. (2008). Sustaining Life: How Human Health Depends on Biodiversity. Oxford University Press.

Dupuis, A. P., and Hann, B. J. (2009). Warm Spring and Summer Water Temperatures in Small Eutrophic Lakes of the Canadian Prairies: Potential Implications for phytoplankton and Zooplankton. Journal of Plankton Research, 31(5), 489-502.

Jain, A., & Singh, S. K. (2013). Limnological Studies Related to Physico-Chemical Characteristics of Water in Anasagar Lake, Ajmer, Rajasthan. International Journal of Advance Research and Innovation, 1(1), 65-72.

Prasath, B. B., Nandakumar, R., Kumar, S. D., Ananth, S., Devi, A. S., Jayalakshmi, T., and Santhanam, P. (2013). Seasonal Variations in Physico-chemical Characteristics of Pond and Ground Water of Tiruchirapalli, India. Journal of Environmental Biology, 34(3), 529.

Revadekar, J. V., Kothawale, D. R., Patwardhan, S. K., Pant, G. B., and Rupa Kumar, K. (2012). About the Observed and Future Changes in Temperature Extremes Over India. Natural hazards, 60, 1133-1155.

Sharma, R. C., Singh, N., and Chauhan, A. (2016). The Influence of Physico-chemical Parameters on

Phytoplankton Distribution in a Head Water Stream of Garhwal Himalayas. A Case Study. Egyptian Journal of Aquatic Research, 42(1), 11-21.

Singhal, R. N., Jeet, S., & Davies, R. W. (1986). The physico-chemical environment and the plankton of managed ponds in Haryana, India. Proceedings: Animal Sciences, 95, 353-363.

Unanam, A. E., and Akpan, A. W. (2006). Analysis of Physicochemical Characteristics of Some Freshwater Bodies in Essien Udim Local Government Area of Akwa Ibom State, Nigeria.

Verma, R., Singh, U. B., & Singh, G. P. (2012). Seasonal distribution of phytoplankton in Laddia dam in Sikar district of Rajasthan. Vegetos, 25(2), 165-173.