

WATER QUALITY ASSESSMENT USING PHYSICO-CHEMICAL PARAMETERS OF PALASANI POND, JODHPUR DISTRICT, RAJASTHAN, INDIA

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ABSTRACT

The present study was undertaken to assess the quality status of water by using physico-chemical parameters of Palasani pond of Jodhpur District, Rajasthan, India. Monthly change in physico-chemical parameter was carried out for a period of one year from March 2017 to February 2018. In the present study the physical chemical parameter such as Transparency, Temperatures, Turbidity, pH, Dissolved oxygen, Phosphate, Biological Oxygen Demand, Total alkalinity and Total hardness. Present study shows that only one parameter (D.O.) is crosses permissible limits of WHO. Results showed that the quality of water from this pond is within the permissible limits and can be used for domestic purpose, irrigation and pisciculture.

Keywords: *Physico-chemical parameters, Water quality, Palasani pond, Pisciculture*

Introduction

Water is an enormous resource of nature. It requires good quality water to live each organism. Human is constantly increasingly contaminating water sources due to its increasing needs. Increased anthropogenic activities in and around these water bodies, damage the aquatic ecosystems and ultimately affect the overall physio-chemical properties of water (Upadhyay *et al.*, 2010). The quality of water present in any ecosystem gives important information about that ecosystem. Many physical, chemical and biological factors are change due to contamination of water quality. Many parameters are used to monitor and assess pollutants present in water. The healthy aquatic ecosystem is depended on the physico-chemical and biological characteristics (Venkatesharaju *et al.*, 2010).

Rajasthan is the largest state of India as well as gifted with different and full filled by disparity topography character, North West Part of the Rajasthan known as Thar Desert, this desert extreme condition like insufficiency of water, famine and drought are frequent, high temperature fluctuations, low rainfall. In this condition water is limiting factor for biotic community. Water is present in the Thar Desert in the form of pond, reservoir, naddies, beri, baweri, and perennial lake etc. Palasani pond is an important water body in Jodhpur district, Rajasthan. It is a major source of potable water in addition to domestic purpose and irrigation in rural area.

The purpose of this study is to reveled out the pollution status of palasani pond in terms of physico-chemical characteristics of water. Hence, some information receives through physico-chemical characteristics of water in the Palasani pond.

Material and method

Study area

Palasani is situated 45 km on the east south of Jodhpur district and it's characterized by typical arid conditions. The present study has been carried out on Palasani pond of Jodhpur district in Rajasthan. The topographical situation of Palasani pond is 26°12' 26" N 73°18' 35" E. The catchment area of Palasani pond is 4.5 sq. km. The length of the pond is 0.8 km and average depth is 2.10 meter. Water storage capacity of Palasani pond is about 120 million litres. The pond is anthropogenic and its water used for domestic purpose and irrigation. The pond is surrounded by semi urban and semi agriculture area.

Collection of samples

During the study, water sample was collected at monthly intervals from March 2017 to February 2018 from pre-selected three study sites. Some physico-chemical characteristics of pond water were studied at the site such as Temperature, pH, Transparency which were determined by Thermometer, Digital pH meter and Visual Secchi Disc respectively, while remaining parameter like DO (Dissolve Oxygen), Total alkalinity, Total hardness were analysed by Titrimetry method in laboratory and other parameters like Turbidity, BOD (Biological Oxygen Demand) and Phosphate were analysed as per the procedure given in APHA (2005) and Trivedy and Goel (1986). After that seasonally analysis work was also done, measurement of seasons were taken according to India Meteorological Department.

Research Paper



Figure 1 Location map of the sampling sites. (Source: Google map)

Result and Discussion

The data regarding physico-chemical parameters are represented in table 1 for monthly variation and in figure 2, 3 and 4 for seasonal variations.

Transparency: Transparency of pond water 29.14 cm to 41.13 cm. Transparency of water is inversely to turbidity which in turn is directly proportional to the amount of suspended organic and inorganic matter (Rukasana and Srivstava, 2002). Some workers believed wind action and organic matter influence transparency (Edmondson, 1961 and Ganapati, 1962). The transparency of water is affected in various seasons due to algal blooms and suspended sediments (Horn and Goldman, 1994).

Temperature: Temperature of water is one of the most important factor in an aquatic environment (Mathur *et al.*, 2008). During the study period water temperature was recorded in the range 19.4 °C to 29.8 °C. This temperature is better for survival of fauna and flora. Temperature is basically important parameter which affects the chemical and biological characters of water (Trivedi and Goel, 1986). The Ambient temperature is most common ecological factor which is essential for overall temperature of atmosphere. Similar finding in this region was reported by Vyas and Nama (1991).

Table 1: The monthly average of physico-chemical parameters in various samples Collected from different sites at Palasani Pond, during March 2017 to Feb 2018.

S.NO.	Parameters (Unit)	2017										2018	
		March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
1	Transparency (cm)	37.26	38.22	41.13	38.56	38.86	29.14	36.12	35.96	33.14	29.18	36.24	37.63
2	Temperature (°C)	23.2	24.1	26.4	29.8	28.4	27.6	26.12	24.6	20.3	19.4	19.9	21.2
3	Turbidity (mg/L)	24.12	23.02	23.43	23.49	26.07	24.14	24.47	24.18	24.56	24.15	23.05	23.18
4	pH	8.1	7.9	7.6	7.9	8.3	7.9	8.1	7.6	7.2	7.5	7.9	7.9
5	D.O. (mg/L)	5.26	4.63	5.12	7.14	6.38	5.62	4.28	4.76	5.26	5.18	6.71	7.8
6	B.O.D. (mg/L)	3.3	3.8	4.5	5.6	4.8	3.5	2.6	3.2	4.1	3.6	4.1	3.9
7	Phosphate (mg/L)	0.4	0.4	0.3	0.8	1.1	1.2	0.8	0.7	0.7	0.5	0.3	0.5
8	Total Alkalinity (mg/L)	91	43	81	52	104	86	67	72	45	49	71	79
9	Total Hardness (mg/L)	120	160	102	138	168	180	158	170	95	147	170	132

Turbidity: Suspension of solids mainly soil particles and microorganism in water interfering with passage of light is called turbidity. This turbidity is better for survival for aquatic life. Turbidity of pond water varied between 23.02 cm to 26.07 cm. The highest value of turbidity was in monsoon season 24.56 cm and lowest value in winter season 23.46 cm. Turbidity increase because of the increase in suspended matter like clay, slit, organic matter, planktons and other microorganisms. (Verma and Summarwar, 2012)

pH: pH of a solution refers to its hydrogen ion activity and is expressed as the logarithm of the reciprocal of the hydrogen ion activity at a given temperature (Dixit *et al.*, 2015). The pH of the pond water varied from 7.2 to 8.3. Minimum value was observed in the summer 7.6 while maximum in winter 8.0. It is indicating alkalinity nature throughout study period. pH value is very important for plankton growth (chisty, 2002).

Dissolve Oxygen: The quantity of dissolve oxygen in pond water during the study period varied from minimum 4.28mg/l to maximum 8.02mg /l. Highest D.O. was found in winter 6.56 mg/l. while lowest in Autumn 4.76 mg/l. Only this parameter is found to be more than permissible limit of WHO Which is 7.0 mg/l.(WHO, 1993) lower value of dissolve oxygen in September due to higher rate of decomposition of organic matter. DO is an important parameter, whose presence is vital to aquatic fauna (Medudhula *et al.*, 2012)

BOD: BOD is an important chemical parameter to the oxygen required to degradation of organic matter with the microbial activities. In present study the value of BOD is 2.3 to 2.6 mg /l. The highest value was recorded in May 2017. The minimum value of BOD was noted in the autumn 3.3 mg/l. while maximum in monsoon 4.6 mg/l. It may be due to input of human activities of organic matters.

Phosphate: The phosphates (PO₄⁻) occur in very small quantities in pond and it is an essential nutrient for the maintenance of the fertility of the pond. In present study the value of phosphate is 0.3 to 1.2 mg/l. The highest value was found in August 2017. Highest phosphate was found in winter 1.03 mg/l. while lowest in autumn 0.36 mg/l. Phosphate had a significant role in algal growth and eutrophication (Peterson *et al.*, 1974).

Total Alkalinity: Alkalinity of water during the study period varied from 43 mg/l. to 91mg/l. Higher value of Total alkalinity was observed in the monsoon 80.66 mg/l. While lower value was 61.33mg/l. in autumn. Alkalinity of pond water is due to carbonate, bicarbonates, phosphate, silicates along with hydroxyl ions. An increase in the free CO₂ may result in the increase in alkalinity (Singhal *et al.*, 1986). Alkalinity of water is important for aquatic life in a fresh water system as it equilibrate pH changes resulting from photosynthesis (Kaushik and Saksena, 1989).

Total Hardness: In the present study, total hardness varied from 102 to 180 mg/l. These high value may be due to the concentration of carbonate and bicarbonate salt of calcium and magnesium (Hujare, 2008). Highest total hardness was found in monsoon 162 mg/l. while lowest in autumn 141 mg/l.

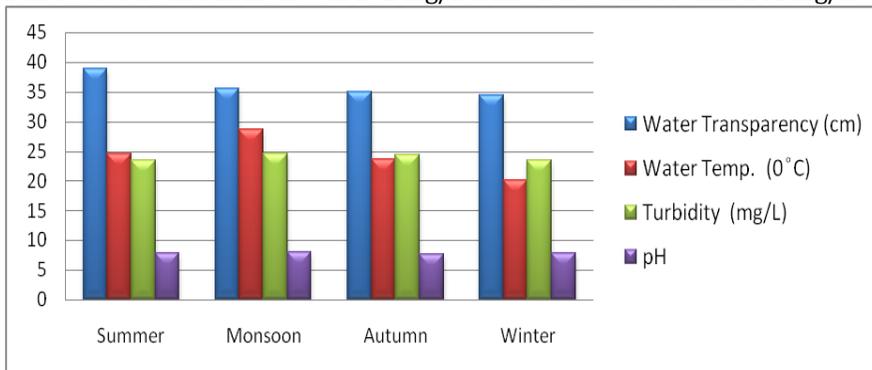


Figure 2 Seasonal variation in physical parameters

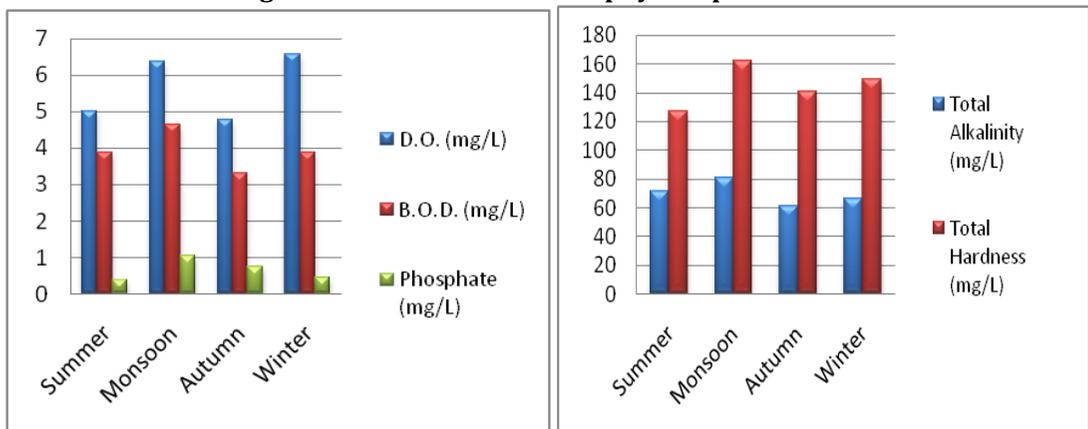


Figure 3 Seasonal variation in chemical parameters Figure 4 Seasonal variation in chemical parameters

Conclusion

The physico-chemical study is very useful to get fairly perfect idea for quality of pond water by determining some parameters experimentally. Present study on this pond has revealed that this is mild polluted water body due to continuous discharge of domestic wastes, more activity of domestic cattle and run off agriculture field. It's observed that D.O. startlingly normally high in Jun-July because of the rate of vaporisation is higher during these months. This pond is not highly polluted because of this pond is situated near famous "Chidiya Nath" temple so the pond is associated with religious beliefs and therefore there are less or no human activities and the pond is not much polluted but it is polluted by domestic cattle. However overall averages of these parameters were found to be within the permissible limits. Result as a pollutant loads slowly increasing in this pond. As such village panchayat should act to stop human activities, cattle and run off agriculture field water to preserve this water body.

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