

STUDY OF PHYSICO-CHEMICAL STATUS OF DHAMAPUR LAKE IN MALVAN TALUKA, DISTRICT SINDHUDURG, MAHARASHTRA

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ABSTRACT

Dhamapur Lake is a man-made lake constructed by the King Nagesh Desai in 1530. It is one of the biggest lakes of the Sindhudurg district. The lake covers an area of about 22 hectares with depth of about 12 meters. The lake receives water during rainy season and remains full throughout the year. The water is utilized for drinking, irrigation and to some extent fishing is also carried out by local people. Maharashtra Tourism Development Cooperation (M.T.D.C) has developed this lake as a tourism spot. The study was undertaken to check the physico-chemical status of Dhamapur Lake with several parameters such as temperature, pH, dissolved oxygen, chlorides, total hardness, nitrites, phosphates. The present study was initiated so as to monitor the base line data on the suitability of water for drinking and irrigation so that changes if any in the future could be evaluated.

Key words: Dhamapur Lake, Malvan, Physico-chemical status.

INTRODUCTION

Quality of water is defined by its abiotic and biotic characteristics. These abiotic and biotic factors directly or indirectly, continuously affect each other and their existence in water body. Changes in abiotic factors may invite pollution of water causing decline or death in aquatic fauna and flora. Generally, lake, reservoirs and ponds are located in close vicinity to human civilization and hence are likely to be polluted. Lakes and ponds serve humans in multiple ways and in turn get polluted due to anthropogenic activities of man. Hence time to time monitoring of these water bodies is required to keep a check on pollution status.

Malvan in Sindhudurg district is well known for its cultural and historical importance. It is famous for its historical monument, the

Sindhudurg Fort. This huge and historical famous sea fort was built by King Shivaji Maharaj in 1664 to keep watch on coastal naval movements of the period. It is one of the coastal tehsil of Sindhudurg district. It is famous for beaches, Malvani Dashavatar (a drama play based on mythological stories) and thus becomes an important tourism place of the Sindhudurg District. As a coastal region the diet of the people mainly includes rice and fish. Fishing and agriculture are the leading occupation of Malvan. Malvan is one of the biologically richest coastal regions in Maharashtra.

Malvan is famous for its Dhamapur Lake (16°02'26.2"N 73°35'41.1"E; Fig: 1) situated between Are and Katta village. It is a man-made lake constructed by the King Nagesh Desai in 1530. The lake receives water during the rainy season and remains filled with water throughout

the year. A beautiful Bhagwati Temple is situated on the bank of the lake. The rich vegetation invites many birds to nest in greenery of hill ranges and thus invites bird lovers to the Dhamapur Lake. The average atmospheric temperature ranges from 16.5 °C to 33.1 °C with minimum and maximum values in January and May, respectively. The average relative humidity varies from 69.4% in April to 98% in July. The climate here is typical of monsoon type, cool and dry seasons with low intensity of north-eastern winds from the land (November to February) and hot-dry season from March to May followed by rainy season (June to September). The annual average rainfall is 2275 mm. Most of the rainfall occurs during June-October.

Figure 1: Dhamapur Lake, Malvan.



MATERIALS AND METHODS

Water samples were collected during morning hours in between 7.00 am to 10.00 am in every month from June 2012 to May 2013.

Table-1. Seasonal variations in the physico-chemical parameters of Dhamapur Lake, Malvan during June 2012 –May 2013.

Sr. No.	Parameters	Monsoon(Jun-Sept)	Post monsoon (Oct-Nov)	Winter(Dec-Feb)	Summer (Mar-May)
1.	Temperature (°C)	30.25	29.5	26	32.66
2.	pH	7.1	7.7	8.2	7.6
3.	Dissolved Oxygen	5.38	4.64	6.19	5.52
4.	Chlorides	43.29	47.49	41.6	43.6
5.	Total Hardness	29.5	20	20	25
6.	Nitrites	0.194	0.194	0.198	0.200
7.	Phosphates	0.301	0.326	0.300	0.269

One liter clean plastic cans were used for sample collection. Parameters like temperature and pH was recorded on the spot. Samples for dissolved oxygen estimation were collected in 300ml BOD bottles and DO was fixed on spot. All the parameters were further analyzed as per the standard methods prescribed by Trivedy and Goel (1986), APHA (1992) and Kodarkar *et al* (1998).

RESULTS AND DISCUSSION

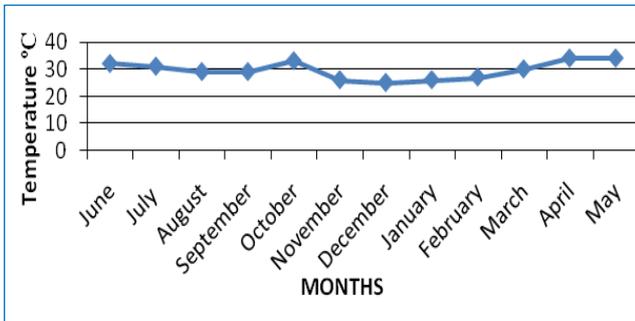
The data of physico-chemical study obtained during the study is presented in Table 1. The results reveal that all the parameters are within desirable limits of BIS specifications for drinking water. However, the lake water can be directly used for irrigation purpose, but should be subjected to purification except phosphates showed seasonal variation. Phosphate values varied slightly throughout the year. The data obtained during the study is grouped into four seasons, monsoon (June to September), post monsoon (October to November), winter (December to February) and summer (Mar to May). All parameters are in mg/L otherwise mentioned.

Temperature:

Temperature is one of the most important factor of an aquatic environment because change in temperature leads to significant change in other abiotic and biotic parameters of that water body. In the present study water temperature varied from 25°C to 34°C. The minimum temperature was recorded in winter season (25°C) while maximum in summer (34°C). Similar results were also reported by Pawar and Mane (2006) at

Sadatpur Lake, Ahmednagar; Biswas *et al* (2011) at Budha Talab in Raipur; Swarnalatha and Rao (1991) and Swarnalatha (1994) at Saroornagar Lake, Hyderabad.

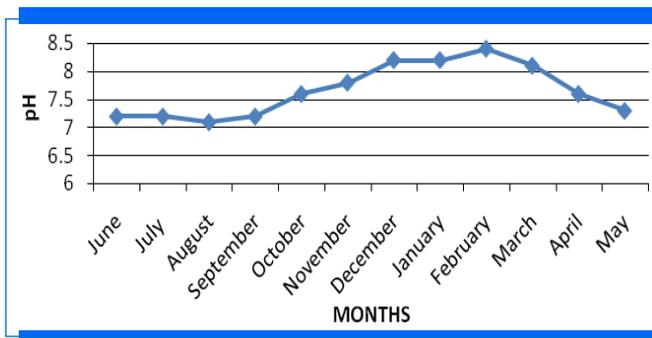
Figure-2. Monthly variation in the temperature of water of Dhamapur Lake, Jun 2012 – May 2013.



pH:

The pH values ranged in between 7.1 to 8.4. The higher values were recorded in winter season (8.4) while minimum values in monsoon (7.1). The pH recorded indicated that nature of waterbody is slightly alkaline. Welch (1952) stated that slightly alkaline conditions are favorable for growth of algal species in lotic systems. Rohankaret *al* (2011) also recorded pH values ranging in between 7.1 to 8.02 at Dharampuri Ward Lake, Ghadchiroli.

Figure-3. Monthly variation in the pH of water of Dhamapur Lake, Jun 2012 – May 2013.

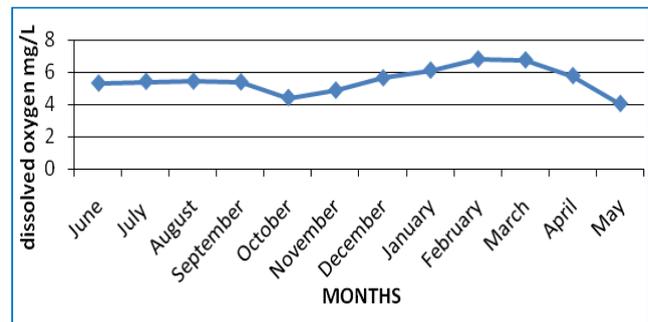


Dissolved oxygen:

Trivedy and Goel (1984) stated dissolved oxygen as one of the most important factor affecting survival and distribution of flora and fauna and also reflecting the physical and biological processing prevailing in waterbody.

The dissolved values ranged in between 4.04mg/L to 6.81mg/L. The values were maximum in winter season while minimum in summer season. Rohankaret *al* (2011) said oxygen balance of lake is tagged with photosynthetic and respiratory activities of biota and chemical oxidization reflecting prevailing physico-chemical conditions of the lake.

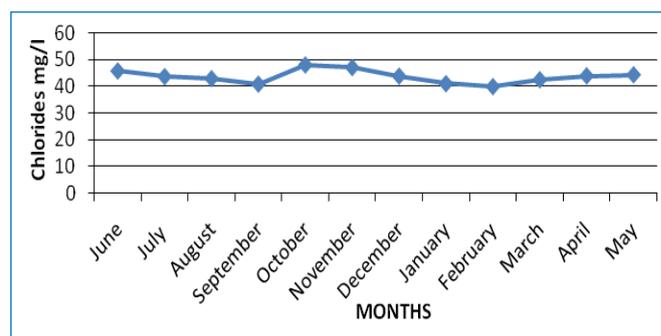
Figure-4. Monthly variation in the dissolved oxygen of water of Dhamapur Lake, Jun 2012 – May 2013.



Chlorides:

The chloride values ranged in between 40.87 mg/L to 47.98mg/L. Higher values were recorded in post monsoon (47.49mg/L) while minimum values were observed in winter season (41.6mg/L). The chlorides values recorded were much low indicating Dhamapur Lake is free of pollution due to animal and human origin.

Figure-5. Monthly variation in the chlorides of water of Dhamapur Lake, Jun 2012 – May 2013.

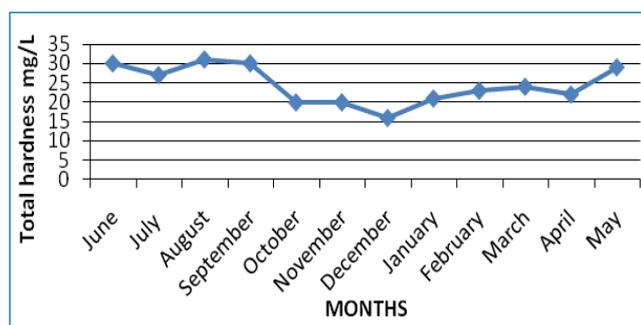


Total Hardness:

The total hardness values recorded at Dhamapur Lake ranged in between 16mg/L to 31mg/L. Higher values were found during monsoon season and summer season which may be due to inflow of water in lake during monsoon while

evaporation of water during summer resulting in concentration of salts. Minimum values were recorded in winter season. Nandan and Mahajan (2000) recorded total hardness values in between 100mg/L to 180mg/L at Hartala Lake, Jalgaon. Higher values upto 230 mg/L were also recorded by Vyas *et al* (1979) in Gordhan Vilas Lake, Udaipur.

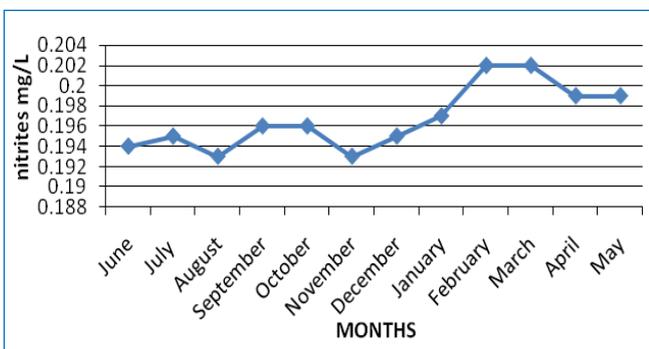
Figure-6. Monthly variation in the Total hardness of water of Dhamapur Lake, Jun 2012 – May 2013.



Nitrites:

The nitrites values ranged in between 0.193mg/L to 0.202mg/L. No significant changes in values were recorded throughout the year. Slight higher values were obtained in summer season. According to Lokare and Rathinraj (1997) nitrite is said to be the intermediate product formed during the bacterial oxidation of ammonia to nitrate.

Figure-7. Monthly variation in the nitrites of water of Dhamapur Lake, Jun 2012 – May 2013.

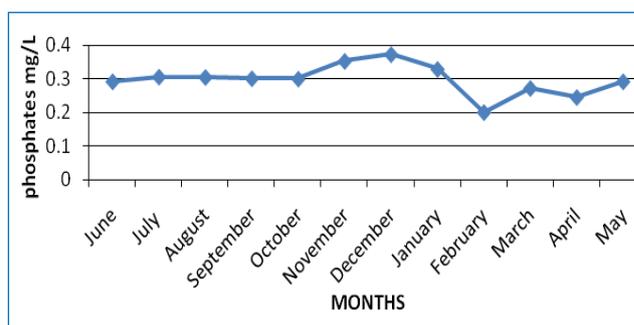


Phosphates:

The values of phosphate ranged in between 0.200mg/L to 0.373mg/L. Higher values were recorded in post monsoon season while lower

values in summer season. Naturally phosphates occur in very small amounts in waterbodies. Waterbodies receives phosphates as a result of agricultural run off and inlet of domestic sewage in it. Higher values of phosphates in post monsoon from nearby agricultural fields. Imevbore (1978) stated phosphate in lentic waters is more or less constant.

Figure-8. Monthly variation in the phosphates of water of Dhamapur Lake, Jun 2012 – May 2013.



CONCLUSION

Quality of water body is defined by certain physical, chemical and biological factors. In present study at Dhamapur Lake, Malvan the water quality is within the desirable limits of BIS. However, lake water can be directly used for irrigation but requires mild purification treatment before supplied for drinking.

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