International Journal of
Life Sciences
International Peer Reviewed Open Access Refereed Journal

Int. J. of Life Sciences, 2021; 9 (1):114-118
ISSN:2320-7817(p) | 2320-964X(o)

Research Article Open Access

A Study on Water Quality Parameters of Malijunga Lake in Gondia District of Maharashtra State, India

Khune CJ[1], Raut MB[2] and Nagpurkar LP[3]

[1] Prof, Dept. of Zoology, | [3]Asso. Prof., Dept. of Chemistry, M. B. Patel College Sakoli, Maharashtra, India
[2] Research Scholar, J. M. Patel College, Bhandara, Maharashtra, India
Email: [1]cjkhune@yahoo.com | [2]mahendraraut5@gmail.com | [3]lp.nagpurkar@gmail.com

Manuscript details:

Received: 24.01.2020
Accepted: 10.02.2021
Published: 31.03.2021

Cite this article as:
Khune CJ, Raut MB, Nagpurkar LP (2021) A Study on Water Quality Parameters of Malijunga Lake in Gondia District of Maharashtra State, India, *Int. J. of Life Sciences*, 9 (1):114-118.

Available online on http://www.ijlsci.in
ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

ABSTRACT

Physicochemical parameters are an important criterion for determining the suitability of water for irrigation, fishing and drinking purpose. The present study deals with the seasonal physicochemical investigation of water of the Malijunga lake, district Gondia of Maharashtra State during the year 2017-19. The physicochemical parameters (Temperature, pH, Conductivity, Transparency, Dissolved Oxygen DO, CO_2, Biological Oxygen Demand BOD, Chemical Oxygen Demand COD, Phosphate and Nitrate) were studied at three sampling sites of the lake during the study period. The analysis of various parameters carried out by using standard methods (APHA, NEERI). The result shows that water temperature ranging from 22.59 ± 0.39 – 29.07 ± 1.10, pH 7.11 ± 0.05 – 7.78 ± 0.08, Conductivity 0.19 ± 0.00 – 0.34 ± 0.01, Transparency 40.80 ± 1.63 – 75.26 ± 2.61, DO 5.65 ± 0.13 – 8.99 ± 0.19, CO_2 3.02 ± 0.11 – 3.92 ± 0.16, BOD 8.22 ± 0.42 – 12.83 ± 0.30, COD 21.15 ± 0.44 – 35.72 ± 1.19, Phosphate 0.36 ± 0.02 – 0.91 ± 0.03 and Nitrate 1.00 ± 0.03 – 0.56 ± 0.05. Above values are within the acceptable range except the site 1 which has mildly polluted due to anthropogenic activities. Regular monitoring of water quality parameters can help to conserve freshwater ecosystem.

Keywords: Water Quality Parameters, Malijunga Lake, Gondia, Conservation.

INTRODUCTION

Conservation of Biodiversity has emerged as key environmental concerns of the day (Ranjit *et al.*, 1992). Water is the most abundant and most useful compound in the world and hence it is called "Jeevan" in Sanskrit or life. Life is not possible without water, the 2/3rd mass of our body is water and 70% surface of the earth is covered by water (Khare *et al.*, 2008). Water of good quality is required for living organisms. The quality of water is described according to its physical, chemical and biological parameters. The physico-chemical methods are used to detect the effects of pollution on the water quality. Changes in the water quality are

reflected in the biotic community structure. Biological production in any aquatic body gives direct correlation with its physicochemical status which can be used as tropic status and fisheries resources potential (Jhingran *et al*., 1969). The physical and chemical parameters exert their influence both, individually and collectively and their interaction creates a biotic environment, which ultimately conditions the origin, development and finally succession of the biotic communities (Salaskar *et al.,* 1997).

Present study deals with a Malijunga lake which is situated in Gondia district of Maharashtra State, India. The lake is situated on the periphery of Nagzira Wildlife Sanctuary near Malijunga village at coordinates N 21.216694° and E 80.117765°. The lake water spread area is around 95 hectare surrounded by hills and thick forest of Sanctuary. In the present study the attempt was made to analyze the physicochemical properties (Temperature, pH, Conductivity, Transparency, DO, CO_2, BOD, COD, Phosphate and Nitrate) from 3 different sites of Malijunga lake to understand the status of water quality from the month of October 2017 to September 2019.

MATERIALS AND METHODS

Eastern site of the lake has named as site I (S1) where anthropogenic activities like washed cloths, bullock cart and other vehicles cleaning, dirt from washed cloths, idol immersion and animal washing activities were commonly seen at this site. The western side of the lake near Malabai Jungadada sacred place has named as site II (S2) of the lake. Minimum human activities and disturbances were seen at S2. Site III (S3) of Malijunga lake is at northern side towards the catchment of the lake.

Fig. 1: Google Map of Malijunga Lake

Fig. 2 & 3: View of Malijunga Lake (left), water quality test underway at Malijunga lake (right)

The water samples were collected fortnightly in clean glass bottles of various sizes from the water surface of study sites. In the present study sampling programme were done from October 2017 to September 2019. Sampling was done in the morning hours from 7.30 to 9.30 am. Water sample were collected from three sites of the lake in fresh unsullied plastic bottles and brought to the laboratory for analysis of physico-chemical parameters by standard methods. The parameters like temperature, pH and conductivity were measured on the spot during the study with the help of water analysis kit Systronics model-371 at the sampling sites. For the dissolved oxygen, the water sample was taken in 300 ml. capacity of BOD bottle and fixed the DO on the spot. Measurement of transparency was done by Secchi disc. The results were calculated as per the standard formulas and methods suggested by APHA (1985), NEERI (1986; 2012).

RESULTS AND DISCUSSION

In the present study physico-chemical parameters of Malijunga lake were analyzed. The mean with standard error value of all physico-chemical parameters of water sample collected from all three sampling sites are presented in table I and table II. The temperature at all the sampling sites range between 22.59±0.39 to 29.07±1.10. Similar observations reported by Punam (2017) with lowest water temperature 24.66±1.23 during winter season and highest water temperature was 30.99±3.75 during summer in Chandpur lake of district Bhandara, Maharashtra. In the current investigation pH value of all sites under study were slightly alkaline throughout study period which ranges from 7.11±0.05 – 7.78±0.08. Similar observations were reported by Bhaskar (2013) with minimum pH value 7.10±0.88 during winter season and maximum 7.84±0.43 during summer season in Shionibandh lake of district Bhandara, Maharashtra. During the present study the conductivity values were differ from 0.19 ± 0.00 during winter season and 0.34 ± 0.01 during summer season. Acharjee *et al*., (1999) also observed the similar observations in Dighali Lake of Assam. In the present investigation higher value of electrical conductivity (EC) might be due to increased amount of inflow of ions from the washing of weathered materials from the catchment area. In the present investigation minimum transparency was observed during monsoon season however maximum transparency was recorded during summer season at all sites. Average transparency values fluctuates from 75.26 ± 2.61 during summer season to 40.80 ± 1.63 during Monsoon season. Dutta *et al*., (1988) pointed out that high amount of sand and silt carried by the floods during rainy season results with consequent decrease in transparency. In the present investigation in all sites of Malijunga lake, minimum transparency recorded during monsoon was due to some silt being carried along with runoff, the maximum transparency during summer due to low depth and shallow bed at the collection site. During the study period the minimum mean values of free Carbon dioxide (CO_2) differ from 3.02 ± 0.11 during Monsoon season to 3.92 ± 0.16 during summer season. Koli *et al.,* (2014) observed the CO_2 ranged in between 1.89 to 5.98 mg/lit. The minimum CO_2 observed in monsoon and maximum was during summer season in Tulashi tank, Kolhapur district. During the study period, the minimum mean values of BOD differ from 8.22 ± 0.42 during winter season and maximum 12.83 ± 0.30 during summer season. Higher BOD values in summer may be due to organic load from some agricultural activities at the mouth of the lake towards its catchment and reduced water flow. Udayashankara *et al*., (2013) observed the BOD of Lingambudhi lake, ranged in between 5.9 to 25.9 mg/lit. Mehta *et al.*, (2016) observed the BOD value fluctuates in between 2 to 7 mg/lit. During the study period the mean values of COD varied from 21.15 ± 0.44 during winter season to 35.72 ± 1.19 during summer season. In the present investigation the maximum value of COD was recorded during the summer season from Site I, it might be due to the domestic and agricultural and other anthropogenic activities from nearby areas. During the study period the mean values of Phosphate was differ from 0.36 ± 0.02 during winter season to 0.91 ± 0.03 during summer season. In the present investigation the lower value were recorded during winter season might be due to rapid utilization by aquatic plants and also due to assimilation by phytoplankton while summer maximum may be due to low water level and inflow of agricultural runoff from summer paddy cultivation in some patches at the catchment area. The lower values of Nitrates were recorded during the winter season at all sites whereas the higher values of Nitrates were recorded during monsoon seasons. During study period the mean values of Nitrate were varied from 0.56 ± 0.05 during winter season to 1.00 ± 0.03 during monsoon season.

Table 1- Seasonal Mean Variations of Physico-chemical Parameters in Malijunga Lake in the Year 2017-18

S. N.	Parameters	Winter Season (Oct- Nov-Dec- Jan)	Summer Season (Feb- March- April- May)	Monsoon Season (June- July- Aug- Sept)
1	Temperature	23.00±0.49	29.07±1.10	27.21±0.72
2	pH	7.11±0.05	7.59±0.10	7.77±0.08
3	Conductivity	0.19±0.00	0.33±0.01	0.24±0.01
4	Transparency	53.98±1.01	75.23±2.61	40.80±1.63
5	Dissolved Oxygen (DO)	8.76±0.18	6.53±0.20	5.65±0.13
6	CO_2	3.11±0.13	3.86±0.16	3.02±0.11
7	Biological Oxygen Demand (BOD)	8.22±0.42	12.83±0.30	9.29±0.26
8	Chemical Oxygen Demand (COD)	21.15±0.44	34.89±1.25	24.18±1.37
9	Phosphate	0.36±0.02	0.89±0.02	0.49±0.01
10	Nitrate	0.62±0.05	0.76±0.05	1.00±0.03

Table 2- Seasonal Mean Variations of Physico-chemical Parameters in Malijunga Lake in the Year 2018-19

S. N.	Parameters	Winter Season (Oct- Nov-Dec- Jan)	Summer Season (Feb- March- April- May)	Monsoon Season (June- July- Aug- Sept)
1	Temperature	22.59±0.39	28.59±1.12	27.09±0.66
2	pH	7.13±0.05	7.61±0.09	7.78±0.08
3	Conductivity	0.20±0.01	0.34±0.01	0.24±0.01
4	Transparency	54.00±1.01	75.26±2.61	40.84±1.55
5	Dissolved Oxygen (DO)	8.99±0.19	6.89±0.24	6.08±0.14
6	CO_2	3.15±0.13	3.92±0.16	3.09±0.12
7	Biological Oxygen Demand (BOD)	8.37±0.33	12.72±0.24	9.30±0.27
8	Chemical Oxygen Demand (COD)	21.63±0.45	35.72±1.19	25.15±1.40
9	Phosphate	0.38±0.02	0.91±0.03	0.52±0.01
10	Nitrate	0.56±0.05	0.78±0.05	0.95±0.03

CONCLUSION

In lake ecosystems physico-chemical characteristics can affect both fauna and flora. Biodiversity contributes both directly and indirectly to human wealth. The physico-chemical characteristics lake shows good quality water. Site I of the lake has little polluted due to anthropogenic activities as it is situated towards the village site. The Malijunga lake is most important for wildlife movement mainly in summer season when water scarcity affects during their movement from Nagzira WLS to Navegaon NP corridor and vice-versa. Regular monitoring of water quality parameters can help to conserve freshwater ecosystems.

Acknowledgement

We are thankful to Principal, M. B. Patel College Sakoli, Dist-Bhandara for granting permission for the research work on water quality parameters. We thank the Eco Development Committee of Malijunga village for supporting the field research work. We thank the many villagers who contributed greatly to our understanding of the lake through their local knowledge and direct participation in physico-chemical parameter research work.

Conflicts of interest: The authors stated that no conflicts of interest.

REFERENCES

Acharjee B and Dutta A (1999) Role of physico-chemical parameters in the evaluation of productivity of Dighali lake of Assam. *Environment and Ecology,* 17 (2): 274-279.

APHA (1985) Standard methods for examination of water and waste water. 16 ed. American Public Health Association, Washington D.C.

Bhaskar P (2013) Impact of abiotic factors of Shionibandh reservoir on the fish diversity and productivity. Ph.D. thesis of R.T.M. Nagpur University, Nagpur.

Dutta N, Bandopadhyay B, Trivedi R, Majumdar A and Ahuja D (1988) Hydrological profile of Hooghly sector (Bally to Bandel) of river Ganga. Ecology and Pollution of Indian rivers, Ashish Publishing House, New Delhi, 55-86.

Jhingran VG, Natrajan AV, Banarjee SM and David A (1965) Methodologies on Reservoir Fisheries Investigation in India. Bull, *Cant. Inl. Fish. Res. Ins*. Barrackpore, 12: 1-109.

Khare KC and Jadhav MS (2008) Water Quality Assessment of Katraj Lake, Pune (Maharashtra, India): A Case Study.

Proceedings of Taal 2007: The 12th World Lake Conference, 292-299.

Koli K and Muley D (2014) Water quality assessment of Tulashi tank from Kolhapur district, Maharashtra, India. *International Journal of Emerging Research in Management and Technology*. 3 (4): 1-3.

Mehta G, Deshbhratar S. Sonali R and Mahely J (2016) Assessment of certain physico-chemical parameters of Satpala lake, Virar, Palghar, Maharashtra, *International Journal of Innovative Research in science, Engineering and Technology*. 5 14598-14605.

NEERI (1986) Manual on water and waste water analysis. National Environmental Engineering Research Institute Nehru Marg, Nagpur.

NEERI (2012) Water testing- A laboratory manual salient parameters: council of scientific and industrial research, National Environmental Engineering Research Institute, Nehru Marg, Nagpur.

Punam T (2017) Hydrobiological studies of Chandpur lake, dist- Bhandara (M.S.) with special reference to productivity status, Ph.D. thesis of R.T.M. Nagpur University, Nagpur.

Ranjit Daniels, Joshi NV and Madhav G (1992) On the Relationship between the Bird and Woody Plant Species Diversity in the Uttara Kannada District of South India. *Proc. Natl. Acsd. Sci. USA,* Vol. 89, pp. 5311-5315.

Salaskar PB and Yerangi SG (1997) Studies on Water Quality Characteristics of Shenala Lake, Kalyan, Maharashtra, India. *J. of Aqa. Biol.* 12 (1&2), 26-31.

Udayashankara T, Anitha K, Rao S, Shifa A and Shuheb M (2013) Study of water quality and dynamics analysis of phytoplankton in four freshwater lakes of Mysor, India. *International Journal of Innovative Research in Science, Engineering and Technology.* 2: 2600-2609.