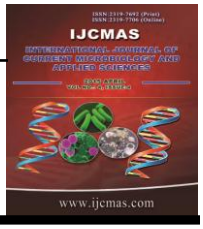
Int.J.Curr.Microbiol.App.Sci (2015) 4(4): 1005-1010

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 4 Number 4 (2015) pp. 1005-1010**
http://www.ijcmas.com



Original Research Article

Water Quality Status of Kokisare-Nadhwade Ponds in Vaibhavwadi Taluka, District Sindhudurg, India

D.L.Bharamal* and D.S.Korgaonkar

P.G.Department of Zoology, S. P. K. Mahavidyalaya, Sawantwadi-416510, India
**Corresponding author*

A B S T R A C T

Keywords

Kokisare-Nadhwade Ponds, Water quality

Water quality status of Kokisare-Nadhwade Ponds in VaibhavwadiTaluka was analyzed during March 2011 to February 2012. Different parameters like Temperature, Conductivity, Hydrogen Ion Concentration, Total Acidity, Total Alkalinity, Dissolved Oxygen, Biochemical Oxygen Demand, FreeCarbon dioxide, Chlorides, Total Hardness, Calcium Hardness, Magnesium Hardness, Phosphates, Sulphates, Nitrates and Nitrites were analyzed during the course of study. The study revealed that all the parameters except pH were within the permissible limits as per IS standards indicating potability of water.

Introduction

Water is most precious commodity of life. It is one of the basic needs for sustaining human life. But all kinds of human activities have adversely affected water qualitatively and quantitatively. The dynamic and heterogeneous relationship gains varied physical, chemical and biological elements in the aquatic ecosystem, which can be recorded by regular monitoring to maintain the integrity and conserve the ecosystem (Ramachandran et al., 2002). Hence, an attempt was made to analyze the water quality status of Kokisare-Nadhwade Ponds inVaibhavwadiTaluka. Kokisare-Nadhwade Ponds is a artificial water body of Vaibhavwadi situated at a distance of just 7 km from Talere village. The water body is surrounded by rich vegetation (figure 1). The daily water requirements of people in VaibhavwadiTaluka are met by Kokisare-Nadhwade Ponds. The district experiences heavy rainfall every year in monsoon and the water body Kokisare-Nadhwade Ponds remains filled with water throughout the year. Regular environmental monitoring allows detection, assessment and management of the negative effects on fresh ecosystems (Karthick, 2010). No such study was done to assess the water quality of Kokisare-Nadhwade Ponds in Vaibhavwadi. The present findings may serve to create awareness among people in the Taluka and will be helpful to the scientific community in general and government in particular as a database for future investigations.

Materials and Methods

Water samples were collected from study site during March 2011 to February 2012

once in every month between 7.30 am to 10.30 am. Keeping in view the accessible area of the water body three different sampling sites viz; K1, K2, K3 were selected and are presented in figure 2, 3, 4 respectively. Parameters like Temperature, Conductivity, Hydrogen Ion Concentration were recorded on the spot, while other water parameters like Total Acidity, Total Alkalinity, Dissolved Oxygen, Biochemical Oxygen Demand, Free Carbon dioxide, Chlorides, Total Hardness, Calcium Hardness, Magnesium Hardness, Phosphates, Sulphates, Nitrates and Nitrites were analyzed in laboratory as per the standard methods of APHA (1985), Trivedy and Goel (1986), Pande and Despande (2012).

Result and Discussion

The results of the physico-chemical analysis of Kokisare-Nadhwade Ponds are presented in Table 1. The values of some parameters did not show variation but fluctuated unevenly. Temperature is one of the most important ecological factors, which controls the physiological behavior and distribution of organisms (Moundiotiya*et al.*, 2004). Temperature values were recorded in between 25°C to 32°C of which high values (32°C) were recorded in month of June, August and October, while minimum temperature values (25°C) were recorded in month of December. Jain *et al* (1996) has also made similar recordings in temperature variation of Halai Reservoir of Vidisha District, India. Similar findings were also recorded by Shastri and Pendse (2001) of the Dahikhura Reservoirs. Conductivity values of Kokisare-Nadhwade Ponds ranged in between 1.009 Scm^{-1} to 1.092 $Scm^{-1.}$ Higher values (1.092 Scm^{-1}) were found in month of September while minimum values (1.009 Scm^{-1}) were recorded in month of February.

pH values ranged between 7.1 to 10.6 showing alkaline nature of water. Higher pH values (10.6) were recorded in winter season. Higher pH of water body is due to presence of sufficient amount of carbonates because of photosynthesis activity which increases the pH as aresult of consumption of CO_2 in the process (Trivedy and Goel, 1986). Minimum pH (7.1) was recorded in monsoon, in month of September. Previous studies have indicated that pH of most of the freshwater lakes, reservoirs ponds range between 6 to 9Wetzel (1975). Khan and Khan (1988) have reported similar findings at SeikhaJheel in Aligarh. Ghose and Sharma (1988)have shown relation of high pH in winter months with increased primary productivity at River Ganga in Patna, Bihar.

In natural waters, most of the acidity is present due to the dissolution of carbondioxide which forms carbonic acid (Trivedy and Goel, 1986). In present findings the total acidity ranged in between 1mg/L to 2mg/L. the maximum values (2mg/L) were recorded in month of October while minimum values (1mg/L) in February. Alkalinity and pH are the factors responsible for determining the amenability of water to biological treatment (Manivasakam, 1980). The recorded values ranged in between 41 mg/L to 47 mg/L. the values were fairly uniform throughout the year showing no seasonal and periodic variation.

All aquatic living organisms require oxygen for their survival. Oxygen gets in water as a waste product of photosynthesis or by diffusion from the surrounding air. In present study, Dissolved Oxygen ranged from 5.82mg/L to 7.89mg/L. The maximum values (7.89mg/L) were obtained in winter season while decreasing values were recorded during summer and rainy season. This was because of increase in temperature which further decreases oxygen holding

capacity of water body. Such type of an inverse relationship of Dissolved Oxygen with temperature was recorded by Bahura (1998) at Bikaner Temple Tank, Rajasthan. Similar findings are also done by Joshi (1992) at Bhagirathi River System in GurhwalHimalays and Shanthi*et al*(2002) at Singanallur Lake.

Aquatic aerobic living organisms require dissolved oxygen to breakdown organic material in water at certain temperature over specific period is called Biochemical Oxygen Demand. The Biochemical Oxygen Demand values recorded in present study ranged in between 0.79mg/L to 4.94mg/L. Minimum values (0.79mg/L) were recorded in winter while maximum values (4.94mg/L) in summer.

Carbon dioxide did not show any seasonal variation. The recorded values showed uniformity with little fluctuation. The values ranged in between 0.18 mg/L to 0.22 mg/L. The higher concentration of chlorides is considered to be an indicator of higher pollution due to higher organic waste of animal origin (Moundiotiya*et al*., 2004). The chloride values ranged in between 31.93 mg/L to 50.30 mg/L. Higher values were recorded in summer because of higher temperature which enhances evaporation and concentration of salts while minimum values were recorded in winter. Similar findings were also recorded by Jana (1973) at West Bengal and Sehgal (1980) at Surinsar Lake, Jammu.

Table.1 Physico-Chemical parameters in Kokisare-Nadhwade Ponds of VaibhavwadiTaluka

Parameters	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Temperature °C	28	28	31	32	30	32	30	32	28	25	26	27
Conductivity Scm^{-1}	1.011	1.024	1.076	1.077	1.076	1.081	1.092	1.087	1.084	1.080	1.050	1.009
pH	9.8	8.9	7.8	7.5	7.5	7.2	7.1	7.8	8.3	8.6	9.4	10.6
Total Acidity mg/L	1.3	1.8	1.1	0.8	1.3	1.6	1.2	2	1.4	1.7	1.2	1
Total Alkalinity mg/L	44	45	45	47	45	47	47	44	42	42	41	44
DO mg/L	6.84	6.47	6.09	6.09	5.91	5.90	5.82	6.030	6.234	7.025	7.899	6.84
BOD mg/L	4.91	4.94	4.88	4.93	4.91	3.74	3.26	0.811	0.88	0.79	1.13	5.24
CO_2 mg/L	0.21	0.22	0.18	0.22	0.22	0.20	0.20	0.22	0.22	0.20	0.22	0.22
Chlorides mg/L	50.10	50.24	50.30	48.76	48	43.78	40.10	39.98	39.38	36.94	31.93	49.98
Total hardness mg/L	21	23	23	26	22	21	21	32	29	23	23	18
Ca hardness mg/L	19	19	21	23	20	22	22	24	24	20	20	16
Mg hardness mg/L	0.934	1.098	1.178	1.387	1.624	1.693	1.816	1.944	1.978	1.741	1.298	0.486
Phosphates µgatoms/L	200	201	196	198	200	201	198	200	197	196	199	200
Sulphates mg/L	0.19	0.33	0.41	0.57	0.55	0.63	0.73	0.72	0.69	0.52	0.41	0.12
Nitrates µgatoms/L	2.13	2.14	2.16	2.21	2.23	2.21	2.17	2.14	2.24	2.29	2.21	2.16
Nitrites µgatoms/L	211.07	209.98	209.75	207.97	207.48	203.02	204.99	200	200.87	203.09	205.89	210.74

Figure.1 Kokisare-Nadhwade Ponds

Figure.2 Sampling site K1

Figure.3 Sampling site K2

Figure.4 Sampling site K3

The total hardness of water is due to the total concentration of Ca and Mg ions, expressed in calcium carbonates. Total hardness values ranged from 18 mg/L to 32 mg/L. Maximum values recorded in winter. Values for Calcium hardness recorded ranged between 16 mg/L to 24 mg/L while values for Magnesium hardness ranged between 0.486 mg/L to 1.944 mg/L. Similar results were observed by Koshy and Nayar (1999) at River Pamba.

Phosphate is generally recognized as the key nutrient in the productivity of water. The main source of phosphorous in natural waters comes from weathering of phosphate bearing rocks and leading of soils in the catchment (Jhingran, 1982). Phosphorous is an important element required for growth of plants and animals. Phosphates in fewer amounts are helpful for growth of planktons and aquatic plants but in high concentration cause eutrophication. The phosphate values recorded during the study ranged in between 196 µgatoms/L to 201µgatoms/L. No significant seasonal change was seen in the values obtained.

Sulphate is another key nutrient factor in the aquatic environment and also supplies oxygen in anaerobic conditions (Nath, 1998). The sulphate values fluctuated in between 0.12 mg/L to 0.73 mg/L. High values were obtained in rainy season which was because of the input of surface water while lower values were recorded in summer season. Similar findings were recorded by (Dad, 1981) on Chambal River.

Nitrate and nitrites are very important nutrient factor in aquatic ecosystems, generally, water bodies polluted by organic matter exhibit higher values of nitrates (Shanthi*et al.*, 2002). In present findings, showed very low nitrate values ranging in between 2.13µgatoms/L to 2.29µgatoms/L. This prevented algal growth and kept water body free of eutrophication. Similar observations are done by (Salaskar*et al*., 1997). Unpolluted natural waters contain only minute amounts of nitrates (Jaji*et al*., 2007). The nitrite profile of the water samples varied from 200µgatoms/L to 211.07µgatoms/L throughout the study period.If the nitrite levels exceed the regulatory limits then it may pose harm to communities when the receiving water bodies are used for domestic purposes. This may give rise to disease called methaemoglobinemia (Fatoki *et al*., 2003).

The present study gave a detailed account on physic-chemical parameters and water quality status of Kokisare-Nadhwade Ponds in VaibhavwadiTaluka, of District Sindhudurg, Maharashtra. All the parameters analyzed were within permissible limits of IS Specifications and hence water is safe as far as its potability is concerned.

Acknowledgement

The authors are grateful to Principal and Head, Dept. of Zoology, S. P. K. M. Sawantwadi, Sindhudurg (M.S.) for providing laboratory facilities in connection with this work and for encouragement during the completion of the work.

References

APHA. 1998. Standard Methods for the Examination of Water and Waste (20th Ed) American Public Health Association, Washington DC.

Bahura, C.K. 1998. A study of physic-chemical characteristics of a highly eutrophic temple tank Bikaner. J. Aqua. Biol. 13(1, 2): 47-51.

Dad, N.K. 1981.Limnological studies on Chambal River with reference to pollution Ph.D. Thesis.Vikram University.

Fatoki, S.O., Gogwana, P. and Ogunfowokan, A.O. 2003. Pollution assessment in the Keiskamma River and in the impoundment downstream water. SA. 29(3): 183-187.

Ghose , N.C. and Sharma, C.D. 1988. Effect of drain water on the physic-chemical and bacteriological characteristic of River Ganga at Patna, Bihar. Ecology and Pollution of Indian Rivers. (Ed. Trivedy, R.K.) Asian publishing house, New Delhi. 255-269.

Jain, S.M., Sharma, M. and Thakur, R. 1996. Seasonal variations in physico-chemical parametersof Halai reservoir of Vidisha District, India. Indian Journal of Ecobiology. 8(3): 181-188.

Jaji, M.O., Bamgbose, O., Odukoya, O. O. and Arowlo, T.A. 2007. Water quality assessment of Ogun River, South West Nigeria. Environ. Monit. Assess. 133(1-3): 447-482.

Jana, B.B. 1973. Seasonal periodicity of plankton in fresh water ponds, West Bengal, India. Journal of International Rev. Ges. Hydrobiology. 58: 127-143.

Jhingran, V.G. 1982. Fish and Fishes of India (2nd Ed). Hindustan Publishing Corporation, India, Delhi.

Joshi, B.D. 1992. Ecobiology of Bhagirathi River system in Gurhwal Himalayas with a view to find out remedial measures for the improvement of uverine ecosystem and to enhance fisheries potentials. A final Technical Report submitted to MoEnv and Govt. of India, New Delhi.

Karthick, B. 2010. Ecology of Stream Diatom Communities Central Western Ghats: Ph.D. Thesis. UOM. Mysore.

Khan, I.A. and Khan, A.A. 1985. Physico-chemical conditions in SeikhaJheel at Aligarh. Journal of Environmental Ecology. 3: 269-274.

Koshy and Nayar. 1999. Water quality aspects of RiverPamba. Poll. Res. 28(4): 501-510.

Manivasakam, N. 1980. Physico-chemical examination of water, sewage and industrial effluents. PragatiPrakashan, Meerut, India.

Moundiotiya, C., Sisodia, R., Kulshreshtha, M. and Bhatia, A.L. 2004. A case study of the JamwaRamgarh Wetland with special reference to physic-chemical properties of water and its environs. Journal of Environmental Hydrology. 12: 24.

Nath, D. and De, D.K. 1998. Preliminary studies on the changes in the physic-chemical characteristics of Hooghly estuary in relation to tides. J. Inland Fish. Soc. India. 30(2): 29-36.

Pande, S.P. and Despande L.S. 2012. A Technical Manual for Water and Wastewater Analysis (1st Ed) Himalaya Publishing House Pvt. Ltd.

Ramachandran, T.V., Kiran, R. and Ahalya, M. 2002. Status conservation and Management of Wetlands Allied Publications (P) Ltd.

Salaskar, P. and Yeragi, S.G. 1997. Studies on water quality characteristics of Shenala Lake, Kalyan, Maharashtra, India. J. Aqua. Biol. 12(1-2): 28-31.

Sehgal, H.S. 1980. Limnological studies of Lake Surinsar Jammu, with reference to Zooplankton and Fisheries. Ph.D. thesis, University of Jammu, Jammu.

Shanthi, K.K., Ramasamy and Lakshmanaperumalsamy, P. 2002.Hydrobiological study of Siganallur Lake at Coimbatore, India. Journal of Nature Environment and Pollution Technology.1(2): 97-101.

Shastri, Y. and Pendse, D.C. 2001. Hydrobiological study of Dahikhura reservoir. Journal of Environmental Biology. 22(1): 67-70.

Trivedy, R.K. and Goel, P.K. 1986. Chemical and biological methods for water pollution studies. Environmental publication, Karad.