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ORIENTAL JOURNAL OF CHEMISTRY
An International Open Access, Peer Reviewed Research Journal

www.orientjchem.org

ISSN: 0970-020 X
CODEN: OJCHEG
2023, Vol. 39, No.(4):
Pg. 1076-1081

Analysis of Fish Productivity in Mohabala Lake, Bhadravati, Maharashtra, India

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http://dx.doi.org/10.13005/ojc/390436

(Received: July 21, 2023; Accepted: August 22, 2023)

ABSTRACT

In recent time lakes are deteriorated by twincongenital and anthropogenic exercises. Generally, lakes bring off the activities precisely interrelated to their substantial, alchemical and organicprobity to conclude thecondition of water. The objective of the study is to develop the freedom of water and fishes from the Lake. Variousrheological parameters such as pH(MPH), Electrical Conductivity (MEC), Dissolved Oxygen (MDO), Total Alkalinity (MTA), Total Hardness (MTH), Chloride (MCL), Nitrates (MN), Phosphate (MP), Turbidity(MTB) and Total Dissolved Solids (MTDS) of lake water isinspected during the month of June. The result shows that due to some parameters Mohabala lake water is not suitable for the freeness of fishes. Hence some special appraisal needed for the cultivation of fishes.

Keywords: Mohabala lake, Sampling procedure, Correlation matrix, Productivity of fish.

INTRODUCTION

Hinterland water bodies are as diversiform as they are bountiful. These are relevantorigin of food and also very useful for the requirementof rural people. The second largest producer of Inland fishes is India. There are more than four hundred species of fishes are convenient in India. Generally in India fishes are cultivated in tank, splash, millpond and streams. For fish elongation proportionately limited principalstake is competent. Maximaltanks, lagoons and millponds in our country are not being methodicallygroomed. In aquatic science the intensification of rheologicalcountenancesbequeath in reconciliation of the categoricalenvirons for determining the concerned in nutritive processes of the water body. It is essential to recognize the rheologicaltopography of water to know the gentilitymanners of the fish in water bodies. The fecundity of water sheets reckon on the rheological and biological symptomatic of water. The rheological parameters of water like pH, Electrical Conductivity, Dissolved Oxygen, Total Alkalinity, Total Hardness, Chloride, Nitrates, Phosphate, Turbidityand Total Dissolved Solids are essential to understand the aquatic nature of the water body. In our study we have analysis the water quality of Mohabalalake for the productivityof fish[1-2].

MATERIALS AND METHODS

The present research deals with the lake water of Mohabala Lake. It is situated at Mohabala village of tehsilBhadravatiof Chandrapur district in Maharashtra, India. It is a fresh water lake Figure 1.

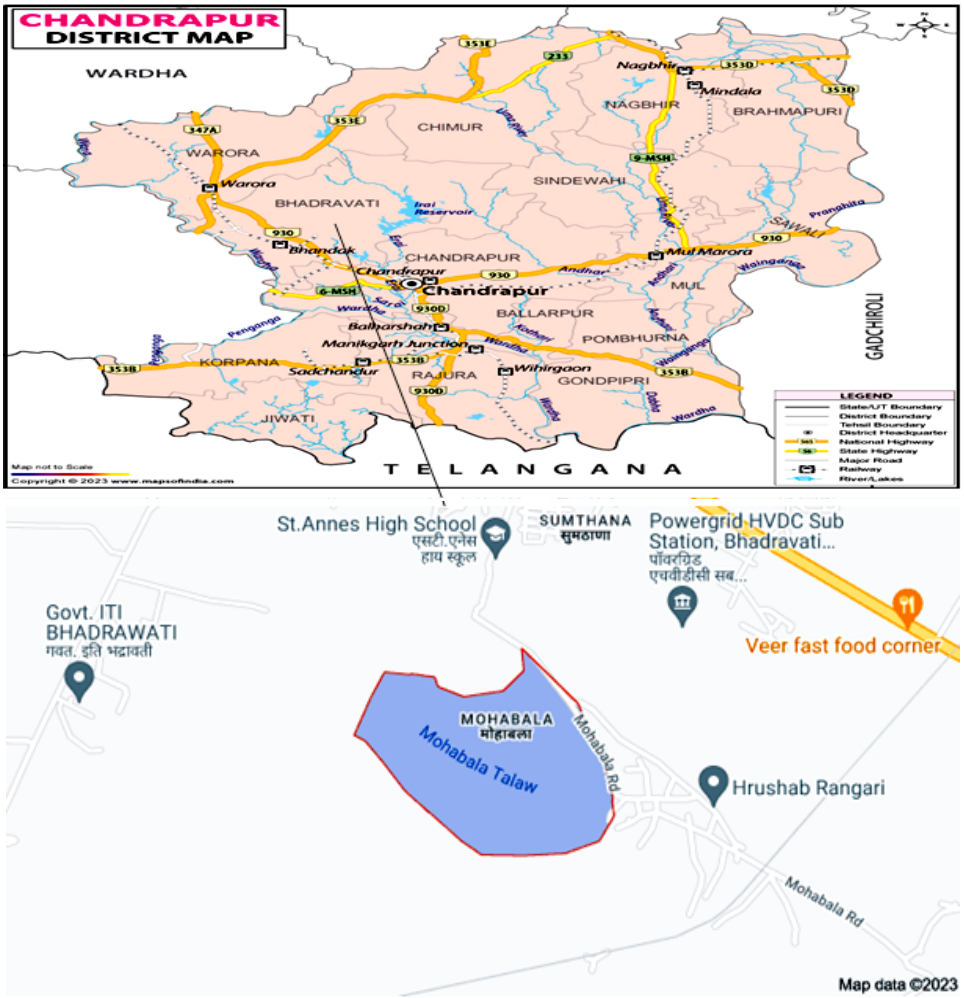

Fig. 1. Map of Location area

The study is based onrheological parameters of water regarding fish production. The following rheological parameters of water are analyzed to understand the quality of lake water and its effect on fish reproduction. The parameters arepH (MPH), Electrical Conductivity (MEC), Dissolved Oxygen (MDO), Total Alkalinity (MTA), Total Hardness (MTH), Chloride (MCL), Nitrates (MN), Phosphate (MP), Turbidity(MTB) and Total Dissolved Solids (MTDS)[2-6].

Sampling procedure

The Mohabala lake water samples are level headed from six venues in a distended kisser bottle and stead fastly wadso that outdoor atmospheric conditions do not impinge it. The gimmicks which are refined are professed underneath. The following physico-chemical parameters of water were analyzed to know the status of lake water and its effect on fish production.[2] The parameters are pH(MPH), Electrical Conductivity (MEC), Dissolved Oxygen (MDO), Total Alkalinity (MTA), Total Hardness (MTH), Chloride (MCL), Nitrates (MN), Phosphate (MP), Turbidity(MTB) and Total Dissolved Solids (MTDS). pH (MPH) is measured by pH meter, for measuring Electrical Conductivity (MEC) Conductivity meter(model no. EQ-660 and brand is Equiptronic) is used. Dissolved Oxygen (MDO) is measured by

Winkler's method. Measurement of Total Alkalinity (MTA) is done by titration method. To measure Total Hardness (MTH) is measured by colorimetric titration with EDTA solution. Model HA-71A is used regarding this. For measuring Chloride (MCL)Chloridometer (Model 3400, ELITechGroupInc) is used. For measuring Nitrates (MN) by phenol disulphonic acid method is used. Phosphate (MP) is measured by by Ethylenediaminetetraacetic acid titration method. Turbidity (MTB) is measured by formazin polymer andfor measuring Total Dissolved Solids (MTDS) TDS meter (Themisto TH-TDS10) is used[7-9].

RESULTS AND DISCUSSION

Physico-Chemical parameters of water

Numerous rheological parameters in association to fish production areexamined in Mohabala Lake and represented in Table 1 and its pictorial representation is given in Fig. 2 and Figrue 3.

Figrue 2 represents the graphical representation of experiment data. In this graph all the attributes are presented according to percentage. The percentage shows regarding the sites of sample location.

pH(MPH)

pH has a crucial role in survival of fishes and other water born species. The pH ranged from 7.28 to 7.42 is observed (Table 1). Das and Nandi has described that pH between 6.5 to 9.0 is very useful for good fishery[11]. It directlyinvolved on fish cultivation as well as on the cultivation and endurance of fish food microbes. pHhas a crucial rolefor determining the productivity of lake water.

Electric Conductivity (MEC)

The conductivity ranged from 245.78 µs/cm to 274.36 µs/cm. Electric Conductivity between 20 and 1500 µs/cm is good enough for hydroponics. So Electric conductivity of Mohabalalake is suitable for fish cultivation.

Dissolved Oxygen (MDO)

Dissolved oxygen range is between 2.46 mg/L to 3.23 mg/L. It has been shown that dissolved oxygen more than 5 mg/L is good for cultivation of fish product.

Total Alkalinity (MTA)

Present investigationexposed that the absorption of total alkalinity is in the 48.36 mg/L to 72.54 mg/L. For good productivity total alkalinity should be more than 20 mg/L. So Mohabala lake water is suitable condition for productivity of fish according to alkalinity.

Total Hardness (MTH)

In this investigation the range of total hardness is 29.46 mg/L to 37.54 mg/L. The suitable value of hardness for fish cultivation is 30mh/L-180 mg/L. So no problem for fish cultivation in Mohabala Lake due to suitability of total hardness limit.

Chloride (MCL)

The Chloride in this investigation is 3.78 mg/L to 4.24 mg/L. At low levels, chloride can negatively affect fish life. High amounts of chloride are toxic to fish and other aquatic species. Here Chloride level is higher. It is not suitable for aquatic life such as fishes and other aquatic species.

Nitrates (MN)

In this study the range of Nitrates are between 0.42 mg/L and 0.56 mg/L Nitrite levels above 0.75 mg/L in water can cause stress in fish and more than 5 mg/L is toxic.

Phosphate (NP)

The range of phosphate is from 2.67 mg/L to 3.45 mg/L. It is not suitable for aquatic species. So it must be reduced by suitable methods.

Turbidity (MTB)

The turbidity limit is between 18.8 mg/L to 23.4 mg/L. Water turbidity is mainly due to suspended inorganic substances like clay, silt etc. The turbidity limit is good for intensive culture system. But 30-80 is suitable for fish cultivation. So it should be careful measurement should be taken to increase the turbidity of Lake Water so that it should be suitable for fish productivity.

Total Dissolved Solids (MTDS)

Total dissolved solids range is between 289.9 mg/L to 332.5 mg/L. Changes in dissolved solids is harmful for fish productivity. 400 mg/L is suitable for the survival of fish product. Less and greater than this is not suitable for the life of fish productivity. So some suitable measurement is required so that the level of total dissolved solids is increased.

Statistical Analysis of Data

The experimental data is statistically analysis using the software SYSTAT 13 software and represented in Fig. 3. Correlation matrix is performed and represented in Table 2. Correlation matrix is used to show the relationship between the parameters. pH has a strong negative correlation with dissolved oxygen, Total Alkalinity and Turbidity. It has strong positive correlation with Phosphate. It has very weak negative correlation with Electric conductivity and Chloride. It has weak positive correlation with Total hardness and Total Dissolved Solids. Electric Conductivity has strong positive correlation with Dissolved Oxygen, Total Alkalinity and Turbidity. It has strong negative correlation with Phosphate and total dissolved Solids. It has very weak negative correlation with Total Hardness and Nitrates. Dissolved Oxygen has strong positive correlation with Total Alkalinity and Turbidity. It has strong negative correlation with Phosphate and Total Dissolved Solids. It has very weak positive correlation with Total Hardness and Chloride. It has very weak negative correlation Nitrates. Total Alkalinity has strong positive correlation with Turbidity. It has weak positive correlation Chloride and Nitrates. It has weak negative correlation with Total Hardness and Phosphate. Chloride has a weak positive correlation with Nitrates[10].

Table 1: Experimental data of the parameters

Name of Station	MPH	MEC(µs/cm)	MDO(mg/l)	MTA(mg/l)	MTH(mg/l)	MCL(mg/l)	MN(mg/l)	MP(mg/l)	MTB(mg/l)	MTDS(mg/l)
MBL1	7.30	274.36	3.23	65.32	36.56	3.85	0.45	2.82	22.5	300.5
MBL2	7.42	263.42	2.58	56.76	32.54	4.12	0.52	3.14	19.8	298.6
MBL3	7.32	254.36	2.67	68.45	33.42	3.78	0.56	3.45	23.4	332.5
MBL4	7.28	273.63	3.12	72.54	29.46	4.24	0.45	2.67	22.6	289.9
MBL5	7.35	245.78	2.46	48.36	33.65	3.65	0.43	3.25	18.8	324.7
MBL6	7.37	263.54	2.83	62.32	37.54	3.56	0.42	3.29	21.6	312.6

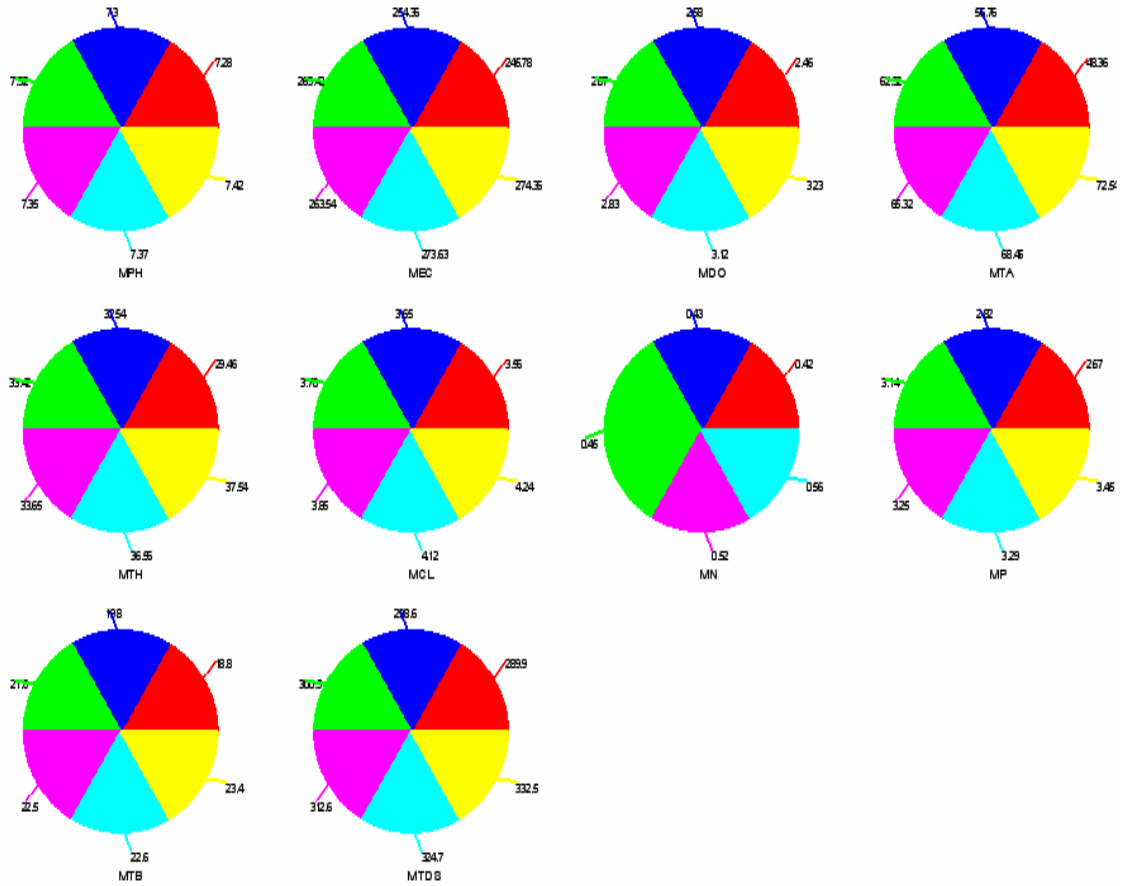

Fig. 2. Graphical representation of experimental data for different sites

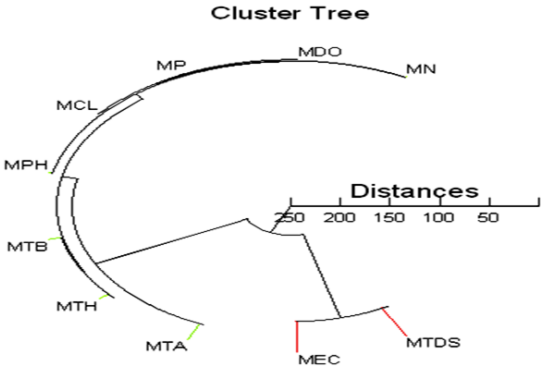

Fig. 3. Cluster tree representation of experimental data

Table 2: Correlation Matrix

	MPH	MEC	MDO	MTA	MTH	MCL	MN	MP	MTB	MTDS
MPH	1.000									
MEC	-0.369	1.000								
MDO	-0.691	0.900	1.000							
MTA	-0.651	0.682	0.733	1.000						
MTH	0.226	-0.045	0.064	-0.232	1.000					
MCL	-0.164	0.558	0.326	0.421	-0.796	1.000				
MN	0.162	-0.172	-0.303	0.235	-0.306	0.294	1.000			
MP	0.531	-0.801	-0.784	-0.417	0.368	-0.673	0.387	1.000		
MTB	-0.667	0.529	0.671	0.941	0.008	0.149	0.296	-0.203	1.000	
MTDS	0.107	-0.849	-0.629	-0.333	0.312	-0.740	0.291	0.872	-0.061	1.000

CONCLUSION

The investigation concludes that some physicio-chemical parameters of water such as Chloride, Phosphate and Dissolved Oxygen are not in suitablecondition for the productivity of fishes. Other parameters are suitable for the survival of fishes. Hence some precautionary measurement should be taken so that the Mohabala Lake water will be suitable for the production of fishes. Bimetal oxides can be used to reduce the chloride level andAluminum sulfate can be used to reduce the Phosphate. To increase dissolved oxygen aquatic plants should be planted.

ACKNOWLEDGMENT

The author thanks AMET University, Kanathur, Chennai, Tamilnadu for giving the facility for performing this research works. The author also thanks to the Editors of this journal for considering my research manuscript.

Conflicts of interest

The author declares that there is no conflict of interest.

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