

Assessment of Physico-chemical Parameters of Manchippa Lake, Nizamabad District, Telangana

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ABSTRACT

In the present work Manchippa lake water samples are collected from three different seasons, four different stations and water quality assessment was carried out from January 2020 to December 2020 on seasonal basis in order to assess the environmental impact of disposal of domestic, waste into the lake. The study was carried out to assess the water quality, analyzed for the various physico-chemical factors by following standard methods, the study area were calculated, pH, total alkalinity, chlorides, total hardness, calcium, magnesium, nitrates, sulphates, total dissolved solids and dissolved oxygen were the parameters considered for the calculation of Water quality index. The water quality index levels of the lake and all the 4 stations were clearly showing that, the status of the water body was oligotrophic and it is suitable for the human consumption. Based on the results all the selected physico-chemical parameters are within the permissible limits of standard methods of (APHA 2017)[1].

Keywords : Manchippa Lake, Physico-chemical parameters, Seasonal variations.

I. INTRODUCTION

Lakes have always been of great importance to mankind being the valuable natural resources. Lakes are used by humans for many commercial purposes, including fishing, transportation, irrigation, industrial water supplies and receiving waters for waste water effluents. In India, the lake systems are getting polluted day by day. Many other pollutants enter lake

water as it flows downstream, including animal waste, human sewage, agricultural runoff, urban runoff due to which unfortunately, most of the lakes are facing pollution problems (Palmer, C.M., 1980)[2]. The productivity of the fresh water community that determines the fish growth, algal growth is regulated by the dynamics of its physico-chemical and abiotic environment. (Wetzel, 1983)[3]. Water maintains an ecological balance between various groups of living

organisms and their environment (Kumar et al., 2004)[4]. The present investigation involves the analysis of water quality in relation to physico-chemical parameters.

II. MATERIAL AND METHODS

The water samples were collected at seasonal basis, for a period of one year at 4 sampling stations in the Manchippa Lake.

Study Area: Manchippa Lake is one of the major irrigation project, located in Manchippa village in the Nizamabad District in Telangana. It is located 17 KM towards South from District headquarters Nizamabad. 17 KM from Nizamabad. This lake is located at 18° 32'3.1" N 78° 06'51.1" E latitude and longitude of the lake. Four samplings point will be identified at this water bodies to collect the samples. Sample station-I Mathadi point, Sample station-II Beside fields, Sample station-III Near dargah, Sample station- IV Beside road side. It has a capacity of 12.87 tmcft. It has a capacity to irrigate 8000 acres and for drinking purpose.

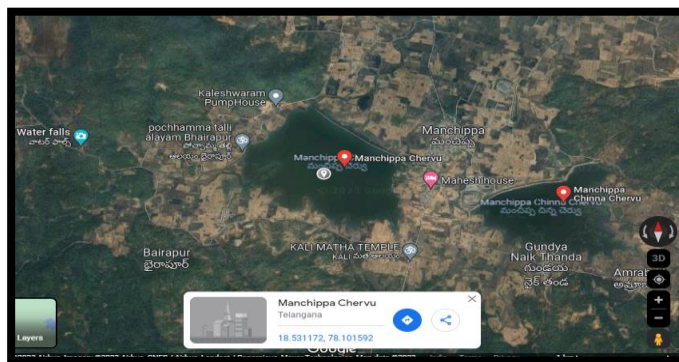


Fig No- 1: Satellite view of Manchippa Lake in Nizamabad District

Analysis of Water: The surface water samples were collected from 4 sampling stations between 8 to 10 am from January 2020 to December 2020. For the collection of samples 2-liter plastic containers were used. Water samples were tested for different

physico-chemical parameters as per APHA method and standard literature (Trivedy, and Goel 1986)[5].



Fig No-2: Showing Lake Over View and Sample collection in Manchippa Lake

III. RESULTS AND DISCUSSION

In the present study the physico-chemical parameters such as Temperature, pH, Carbonates, Bicarbonates, Dissolved oxygen, biological oxygen demand, Chemical oxygen demand, Organic matter, Total hardness, Calcium, Magnesium, Chlorides, Phosphates, Sulphates, Nitrates, Nitrites, Silicates, Total dissolved solids, of water samples taken from Manchippa lake. These parameters were taken at seasonal intervals from 4 stations of the lake.

Temperature: The measurement of temperature is one of the most primary factors, which plays an important role in the metabolic activities of the organism. The temperature was ranging from 21.7° C to 38.34° C, average values in rainy season 22.9° C, winter season 22.4° C, summer seasons 38.34° C during the period from January 2020 to December 2020.(Fig No-3).The maximum temperature was recorded in the summer

season month of May and lowest in winter season December month. Water temperature influenced aquatic weeds and algal blooms [Zafar 1968][6].

pH: pH of water is an important environmental factor which effects the biology and the life cycle of the biotic life. It is recorded in the range of 7.1 recorded in rainy season, 7.8 winter season, 8.6 in summer season pH .(Fig No-3).was estimated by using pocket pH meter at the spot in lake. pH is ranged 5 to 8.5 is best for plankton growth (Tiwari, 2005)[7].

Carbonates: Carbonate is the prime contributor for maintaining pH of a water body and ends its role is of vital importance [Hegdaie et al., 2005][8]. The highest amount of carbonates found to be 42.68 mg/l in rainy season, 51.62 mg/l in winter season, and 52.90 mg/l in summer season. .(Fig No-3).

Bicarbonates: Bicarbonate serves an important role in water biota.Higher value of bicarbonate leads to alkaline pH. The amounts of bicarbonates were identified as 232.68 mg/l in monsoon time 234.24mg/l in winter season and 249.24 mg/l in summer season. (Fig No-4).

Dissolved Oxygen: Dissolve oxygen is an important parameter in water quality assessment as it regulates many metabolic and physiological processes of biotic components. It indicates the pollution in water bodies. Lower DO indicate organic pollution in lake as DO levels in water drop below 5.0 mg/l, many life forms are put under pressure. (Bowman e al., 2008)[9]. Rainy season DO recorded as 6.4 mg/l, winter 8.2 mg/l, and summer season 4.4 mg/l. (Fig No-4).

Biological Oxygen Demand: The highest concentration of BOD 9.1 mg/l recorded in summer season, lowest value 2.6 mg/L recorded during winter season and 5.7 mg/l in rainy season average values were noted. (Fig No-4). High amount of waste along with rain water from the surrounding and addition of organic waste in lake. High biological oxygen in summer was several microbes in water accelerated their metabolic activities (Solanki H.A 2007)[10].

Chemical Oxygen Demand: The highest value 29.00 mg/L lowest values 8.20 mg /l were recorded. Highest

values observed in summer and lowest values were recorded during rainy season. (Fig No-5). High COD value may be due to addition of organic matter with waste discharge into lake. The estimation of COD along with BOD is helpful in indicating toxic conditions and the presence of non-biodegradable substances in the water. (Sawyer. et al.,2002)[11]. The high COD values indicates non-biodegradable oxygen demanding pollutants were present in the water.

Total Hardness: The average values 196.00 mg/L is recorded during summer season. Lowe values 194.00 mg/L were recorded during rainy season and 221 mg/l recorded in winter season. (Fig No-5) High range organic components, detergents, chlorides, high temperature are influence to decrease in water volume and they increase the hardness.

Calcium: Calcium is an important nutrient for aquatic organism. Sewage waste might also be responsible for the increase in amount of calcium. (Udhaya kumar, et al., 2006)[12]. The average values of calcium 46.74 mg/l were noticed in rainy season August and minimum 34.16 mg/l winter season. 49.92 mg/l recorded in summer season. (Fig No-5).

Chlorides: The average concentration of chloride 145.56 mg/l estimated in summer season and lower concentration 127.26 mg/l recorded in winter season and 140.6 mg/l in rainy season. (Fig No-6). The higher concentration of chloride is considered to be an indicator of higher pollution due to higher organic waste of animal origin (Mishra, et al.,2007)[13]. The lowest value of chloride recorded during monsoon season due to the dilution of lake water by rain. (Shastry C.A, 1970)[14].

Silicates: This is an important parameter in fresh water ecosystem which regulates the diatoms population. Silicates are play an important role in the production of algal growth is well recognized. In the present investigation average values ranged 2.18 mg/l in rainy season, 2.24 mg/l in winter season and 2.75 mg/l in summer season(Fig No-6), similar results were identified (Raju Potharaju, M. Aruna 2021)[15].

Organic Matter: The highest average value recorded 2.9 mg/l is recorded in rainy season and lowest average value was recorded of 1.8 mg/l in winter, summer months. (Fig No-6). Organic matter infusion into the lake as outside the basin water inflowing.

Phosphates: Phosphates were recorded very low concentration in Manchippa Lake and the concentrations are influenced by domestic sewage, agricultural drainage, and the release of laundry detergents into the aquatic system. The phosphate - phosphorus was recorded in range of average values 0.44 mg/l in summer season, 0.87 mg/l winter season and 0.76 mg/l in rainy season of observations. (Fig No-7).

Nitrates: The estimated average amount of nitrates in rainy month of July 0.97 mg/l, 0.83 mg/l in winter season and 0.98mg/l summer season were recorded. (Fig No-7). Nitrogen is component in nitrate, nitrite, ammonia, urea, and dissolved organic compounds in an aquatic environment. The highest amount of nitrate concentration was known to support the formation of blooms. (Udama, A.U 2014)[16].

Nitrites: Nitrites are increase with nitrogen rich flood water into the Lake. The average value 0.04 mg/l recorded in rainy, winter seasons and the lowest value was 0.03 mg/l were recorded in summer season. (Fig No-7). The lowest amount nitrite was recorded during the summer and monsoon may due to the utilization by eutrophication. (Abdar. M.R., 2013)[17].

Table No-1 : Representing the parameters seasonal variation one-year average data

Parameters	Rainy season(Jun, Jul, Aug, Sep)- Avg	Winter Season (Oct,Nov,Dec,Jan) -Avg	Summer Season (Feb,Mar,Apr,May) - Avg
Temp(°C)	22.9	22.4	38.34
pH	7.1	7.8	8.6
Carbonates(mg/l)	42.68	51.62	52.90
Bicarbonates(mg/l)	232.68	234.24	249.24
DO(mg/l)	6.4	8.2	4.4
BOD(mg/l)	5.7	8.9	9.1
COD(mg/l)	8.2	29	10
TH(mg/l)	194	221	196
Calcium(mg/l)	46.74	34.16	49.92
Chlorides(mg/l)	140.6	127.26	145.56
Phosphates(mg/l)	0.76	0.87	0.44
Nitrates(mg/l)	0.97	0.83	0.98
Silicates(mg/l)	2.18	2.24	2.75
Organic matter(mg/l)	2.9	1.8	1.8
Nitrites(mg/l)	0.04	0.04	0.03

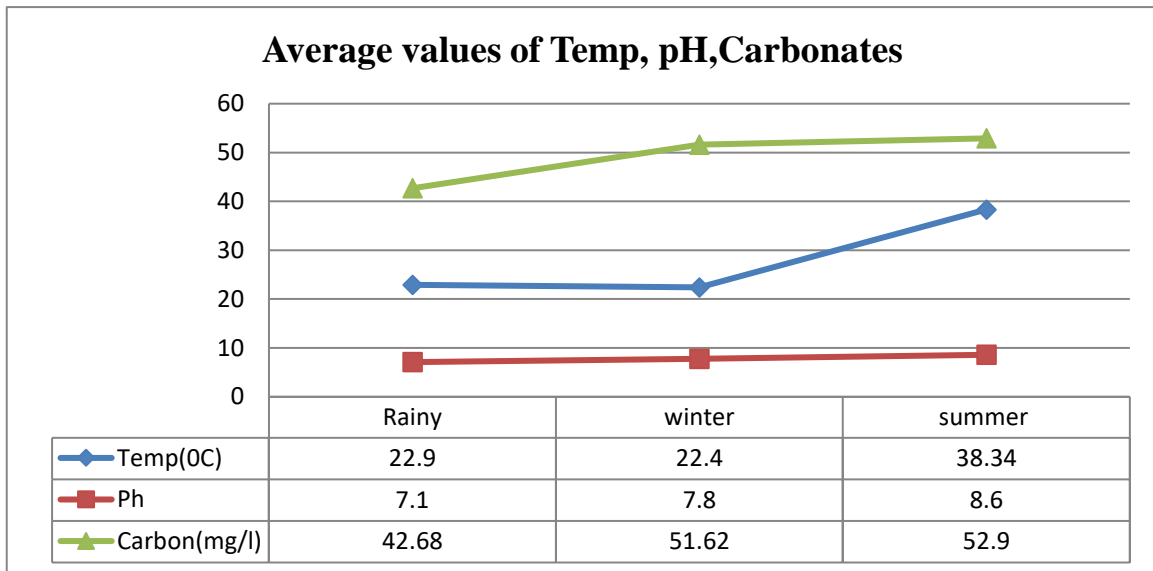


Fig No-3: Graphical data on One year seasonal average values of Temp, pH and Carbonates.

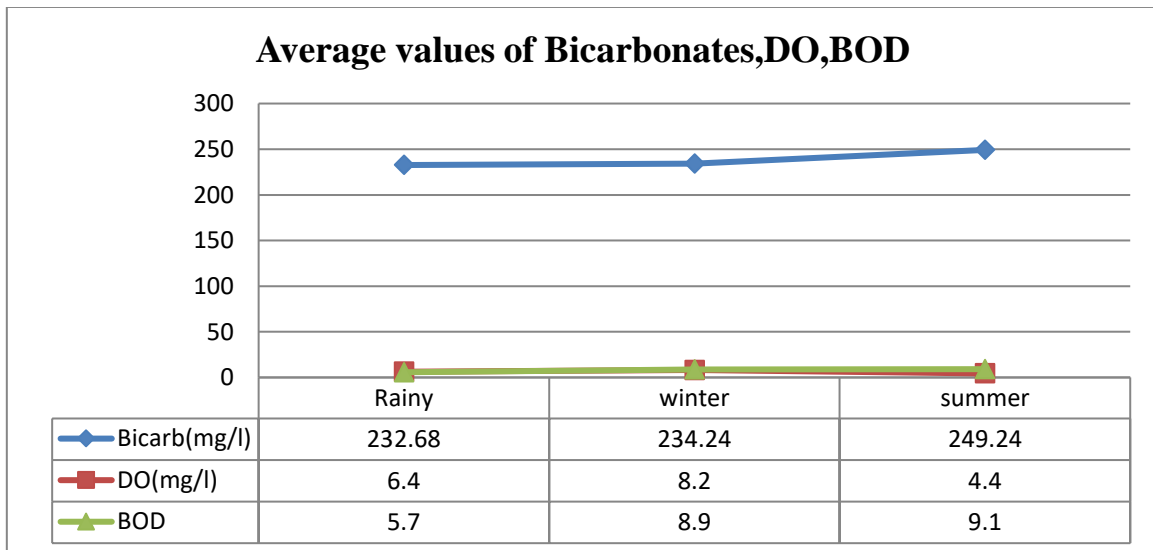


Fig No-4: Graphical data on One year seasonal average values of Bicarbonates, DO and BOD

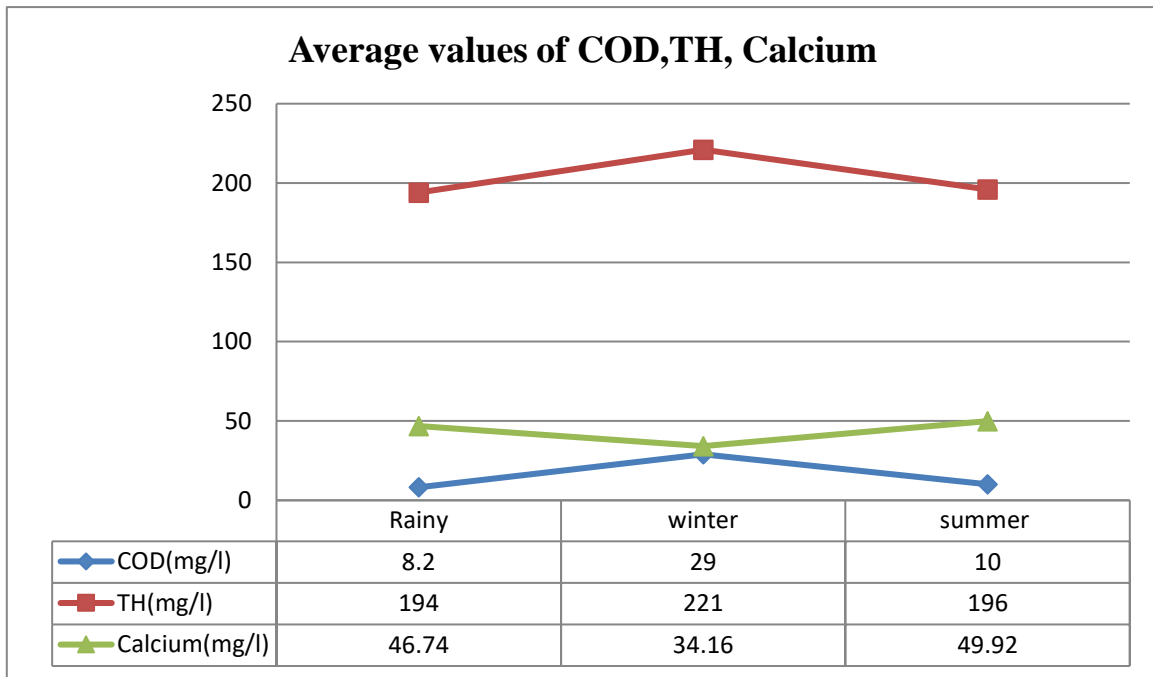


Fig No- 5: Graphical data on One year seasonal average values of COD, TH, and Calcium.

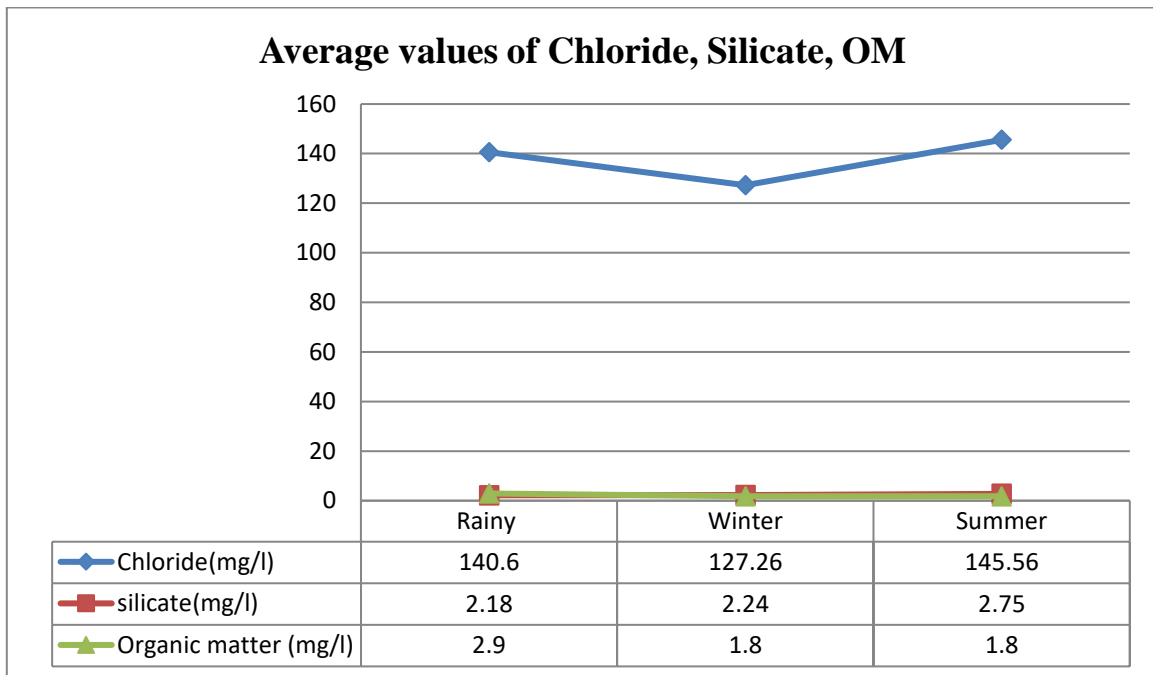


Fig No-6: Graphical data on One year seasonal average values of Chloride, Silicate, and OM.

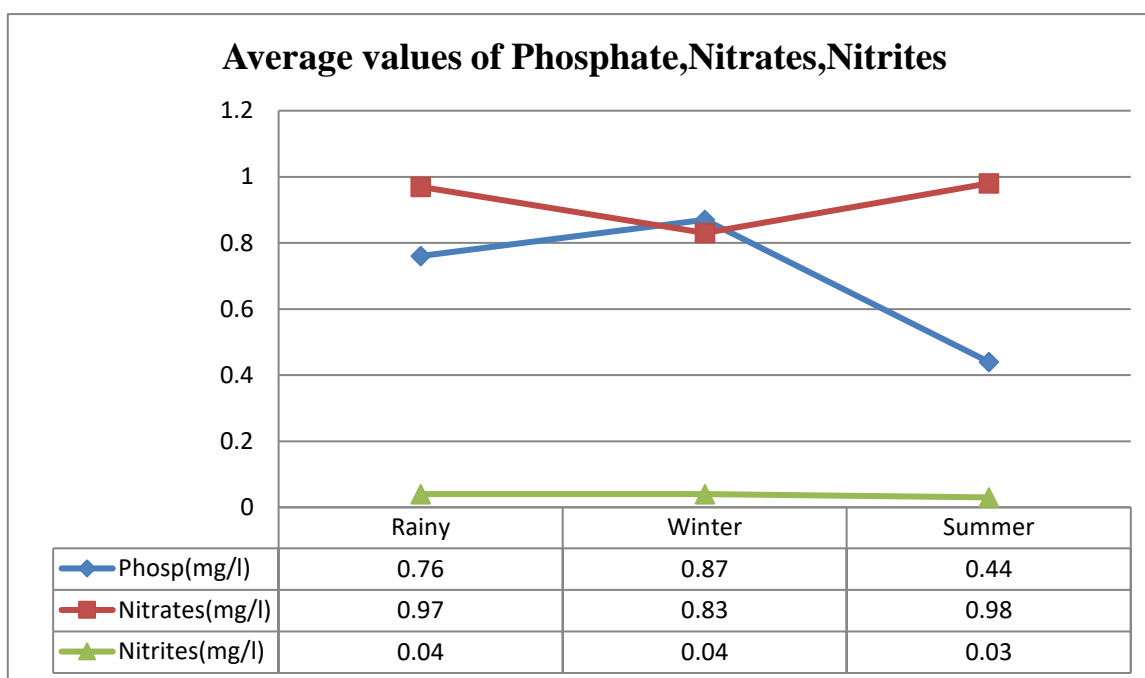


Fig No-7: Graphical data on One-year seasonal average values of Phosphate, Nitrates, and Nitrites.

IV. CONCLUSION

In my present investigation the analysis of Physico-chemical parameters are assed and concluded that the parameters are within the permissible limits prescribed by WHO for drinking water. Seasonal fluctuations are showing. Physico chemical analysis of water of Lake has indicated a continuous change in its trophic state. The water of present Manchippa lake is useful for fish culture, irrigation, as well as drinking.

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