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Analysis of Physico- Chemical Parameters of Water in Madduvalsa Reservoir, India

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Abstract: Water is an essential part of this environment. Now a day pollution is the biggest problem in this world especially water pollution. Major water pollution occurs in rivers and reservoirs which result in unhygienic drinking water, deterioration of crops and loss of field's fertility etc. In this work, it shows the physico- chemical parameters variations of water quality in Madduvalasa reservoir, Madduvalasa; which is a major medium irrigation project. For a time period of nine months i.e. from October 2106 to July 2017 covering three seasons completely and one is for two months. The samples are collected at two different points. And the samples are tested for abiotic variables. The result shows the monthly mean values of all water quality parameters, trophic nature of reservoir and seasonality exerts some influence on abiotic variables.

Keywords: water quality, abiotic variables, seasonality changes, trophic status

I. INTRODUCTION

Water is the basic unit of a life. On this earth surface, it covers more than 75 percent as fresh water or as salt water. Water is required for drinking, bathing, industrial and agricultural purpose. India is one of the agricultural based countries and the agriculture sector alone contributes 14.6 percent in national GDP and 55 percent employment. In India, for agriculture purpose, it uses more than 80 percent surface water and nearly 60 percent of ground water. Due to the increase of population which leads to pollution water become the most scarcity problem now. India always faces the water scarcity problem in the agricultural field; to overcome this India has taken water conservative measures and constructed reservoirs, dams across the country on rivers.

Due to the increase in pollution, even the water in reservoirs also gets affected. And nutrients have an important role in fresh water bodies, also in agricultural fields. So, it is necessary to monitor the quality of water in terms of physico- chemical parameters and also in biological matter. In this study, it has been shown that the analysis of physico- chemical parameters of water in Madduvalasa reservoir, Madduvalasa, Andhra Pradesh.

The main aim of this study is seasonal changes of water quality parameters and their effects in irrigation field and aqua culture. And also the trophic status of the reservoir based on some abiotic parameters.

II. MATERIALS AND METHODS

A. Study Area

Sri Gorle Sriramulu Naidu Madduvalasa reservoir aka Madduvalasa dam is a major medium irrigation project with water spread area of 6600 acres in Vangara Mandal, Srikakulam district, Andhra Pradesh, India; located between longitude 83° 37' 20"E, latitude 18° 35' 30"N. And this dam is constructed across the rivers Suvarnamukhi and Vegavati tributaries of Nagavali River. It is intended to serve an ayacut of 24,700 acres in six mandals in the district.

B. Sampling and Analysis

This project deals with the physio- chemical parameters analysis of water in Madduvalasa reservoir. Sampling period was October 2016 to July 2017, which covers post monsoon, winter, summer completely and monsoon only for two months. The samples are taken at the end of each month at two stations. One is in the limnetic zone of the reservoir and another is at the canal. Samples are thoroughly washed with tap water and with distilled water. Before taking the samples the samples were rinsed with the water at the sampling site.

The samples are kept in an ice bucket while taking to the laboratory. The Temperature (Temp.) is measured at the site using thermometer; while other tests i.e. pH, Electrical Conductivity (E.C.), Total Dissolved Solids (TDS), Total Hardness (TH) as CaCO₃ mg/l, Turbidity, Nitrate (NO₃), Phosphate, Sodium (Na), Chloride, Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Dissolved Oxygen (DO) and Alkalinity are tested in the laboratory according to the procedures, and color is observed at the site itself.

III. RESULTS

The results have been shown in the form of graphs. The values are taken an average value of each month of each parameter. And trophic nature of reservoir based on abiotic parameters has been tabulated.

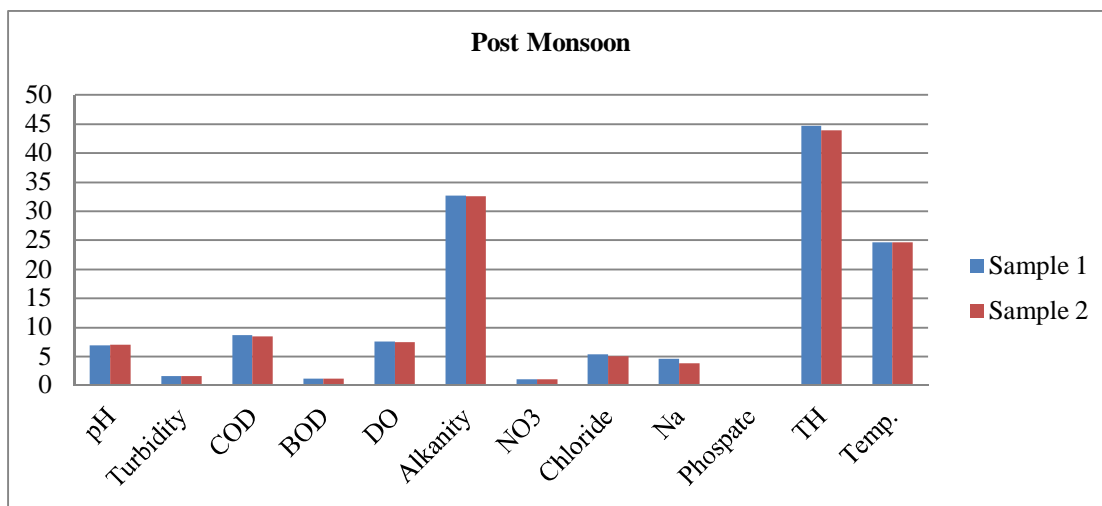


Figure 1: Showing physico- chemical parameters of water during post monsoon i.e. October 2016 to December 2016.

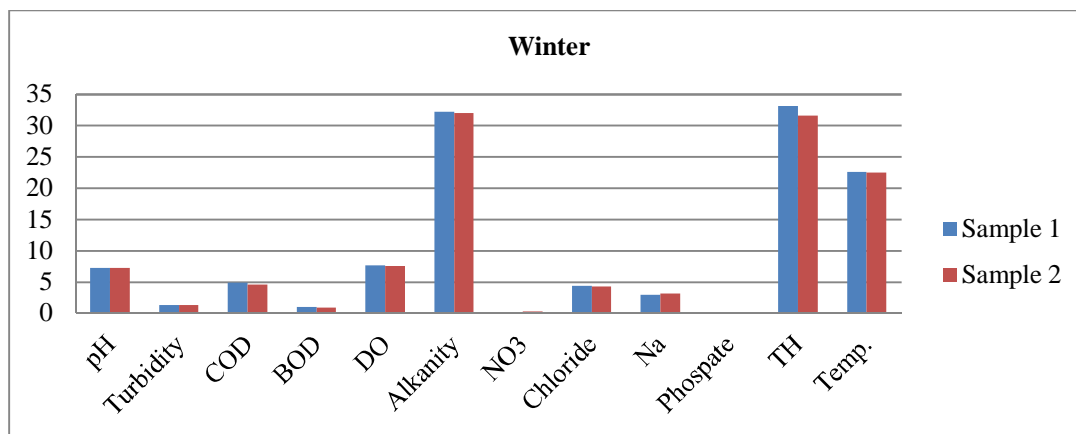


Figure 2: Showing physico- chemical parameters of water during winter i.e. January 2017 to February 2017.

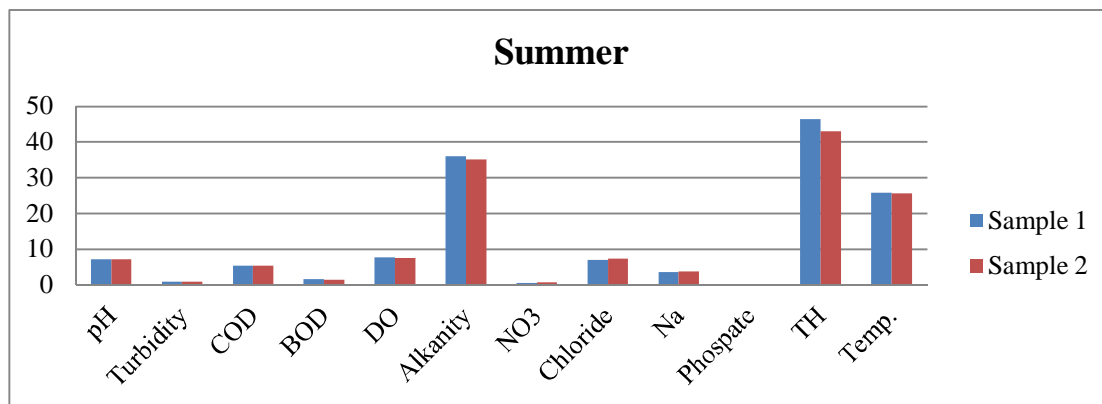


Figure 3: Showing physico- chemical parameters of water during summer i.e. March 2017 to May 2017.

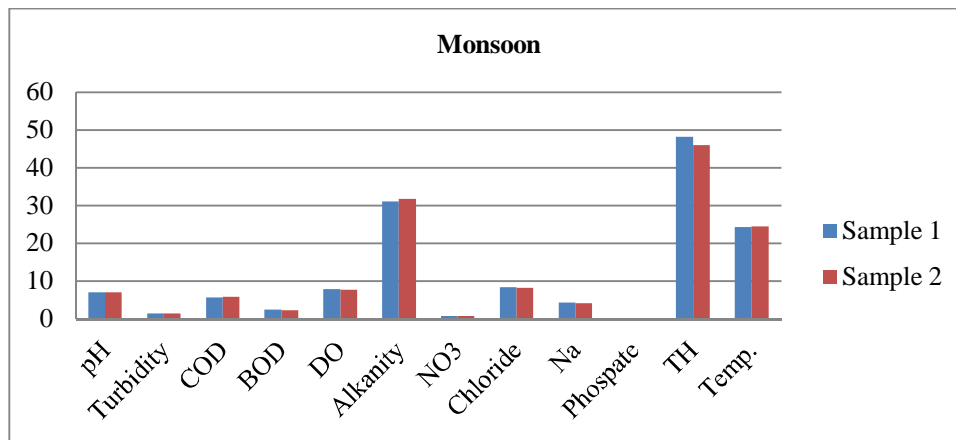


Figure 4: Showing physico- chemical parameters of water from June 2017 to July 2017.

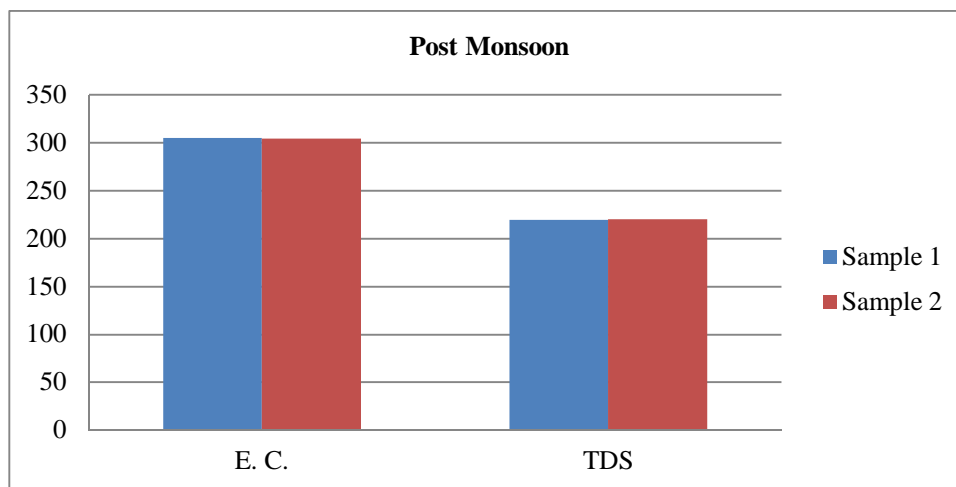


Figure 5: Showing Electrical Conductivity and TDS of water during post monsoon i.e. October 2016 to December 2016.

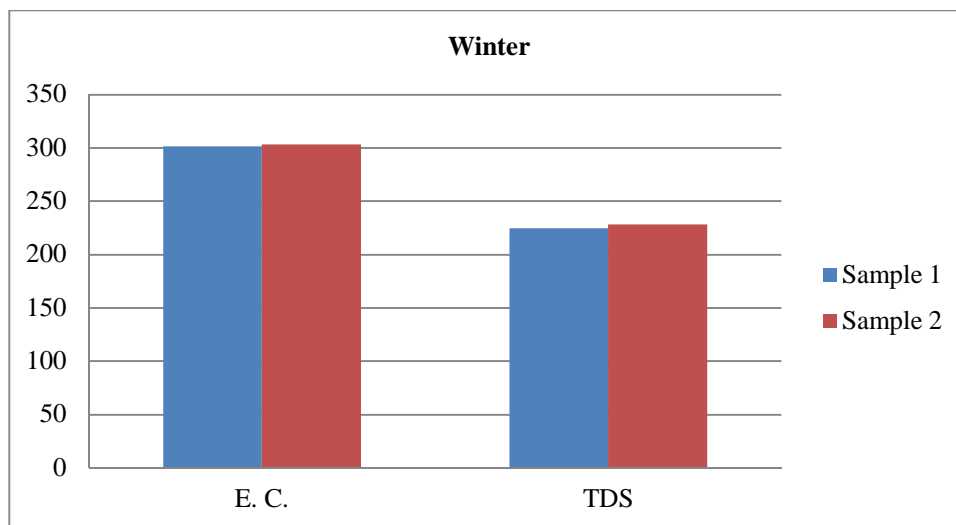


Figure 6: Showing Electrical Conductivity and TDS of water during winter i.e. January 2017 to February 2017.

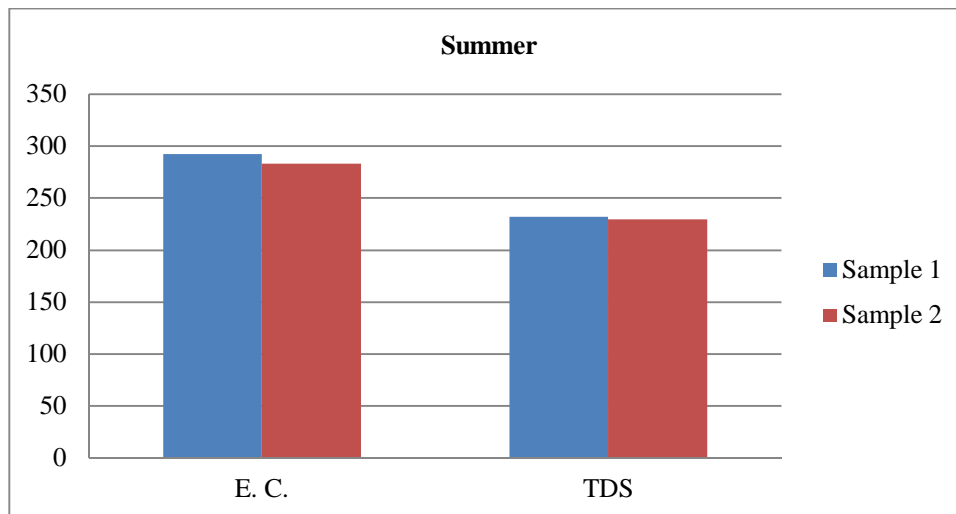


Figure 7: Showing Electrical Conductivity and TDS of water during summer i.e. March 2017 to May 2017.

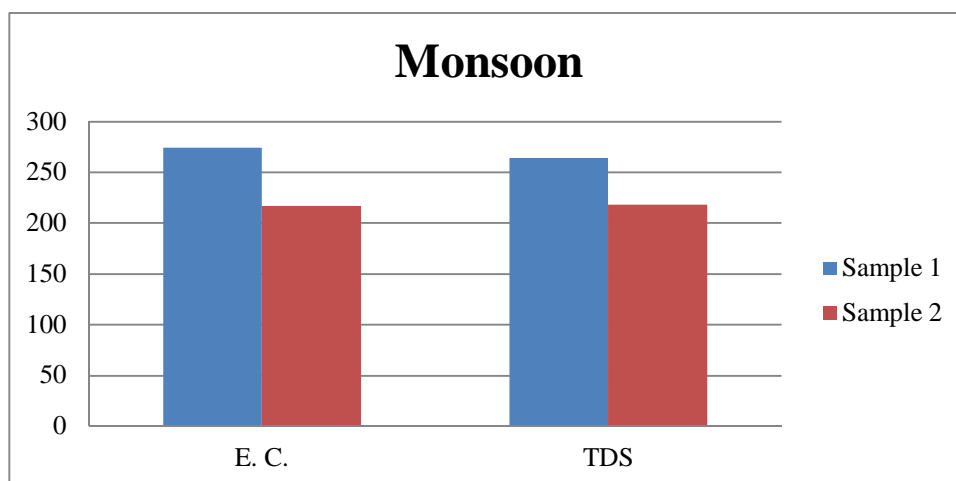


Figure 8: Showing Electrical Conductivity and TDS of water from June 2017 to July 2017.

Table 1: Trophic nature of Madduvalasa reservoir on the basis of some abiotic parameters

Parameter	Range of reservoir	Trophic status of reservoir
Temperature	22.56- 25.65	Mesothermal
pH	6.91- 7.24	Mesotrophic
Electrical Conductivity	264- 305	Mesotrophic
Total Hardness	31.56- 48.24	Soft water
Alkalinity	32- 35.99	Medium nutrients
Nitrate	0.2- 1.05	No pollution
Chloride	4.22- 8.32	Mesotrophic
Phosphate	0.0- 0.032	Meso trophic

IV. DISCUSSION

The pH of water observed as 6.91 (post monsoon) to 7.24 (winter); generally the minimum value has to be in monsoon because of rainfall but in this case, only two months have been observed in monsoon. The Turbidity value over the study period, it changed from 0.84 NTU to 1.64 NTU, the higher value in post monsoon due to the surface runoff of rainfall and lower value in summer due

to the settlement of slit and residues etc. after post monsoon. The lower Chemical Oxygen Demand value noted in winter 4.68 mg/l, the higher value in post monsoon 8.54 mg/l. Biological Oxygen Demand is always lower than the Chemical Oxygen Demand. During this study period, it has been observed that the minimum value in winter 0.98 mg/l and maximum value in monsoon 2.48 mg/l. Dissolved Oxygen value varies from 7.42 mg/l in summer to 7.86 mg/l in post monsoon.

In this study, Alkalinity showed lesser values in monsoon i.e. 31.08 mg/l and higher values in summer i.e. 35.50 mg/l. Total Hardness has minimum and maximum values as 31.56 mg/l in winter and 48.24 mg/l in monsoon respectively; due to the runoff from monsoon season results in releasing of more ions, which results the reservoir has soft water. The Nitrate values varied from 0.19 mg/l to 1.04 mg/l., winter showed the least value whereas high value noted in post monsoon. During this study period, Chloride, Sodium, and Phosphate have been observed minimum in winter i.e. 4.27 mg/l, 2.91 mg/l and 0.028 mg/l while maximum values obtained in monsoon i.e. 8.18 mg/l, 4.21 mg/l, and 0.032 mg/l respectively.

Another important parameter in this physico- chemical analysis is Temperature. The Temperature ranges between 22.47°C in winter to 25.65°C in summer. Monsoon shows the minimum value of Electrical Conductivity 264µS/cm, post monsoon shows the maximum value 305µS/cm; due to the dilution of rain water. During this study period Total Dissolved Solids have been noted minimum value in monsoon 216.66 mg/l and maximum in summer 232 mg/l; generally TDS should be high in monsoon season because a high amount of sediment load carried to the reservoir, but in this case, it has been observed for only two months which comes under pre monsoon season. And as for the higher values in summer is due to the changes in parameters such as Electrical Conductivity.

The trophic nature of the reservoir described by the range of values of abiotic parameters which are analyzed during the sampling period, and it has been concluded that reservoir is in mesotrophic nature.

V. CONCLUSION

Analysis of physico- chemical parameters of water in Madduvalasa reservoir has been studied. All the analyzed water quality parameters are within the limits as prescribed Central Pollution Control Board, India. The seasonal changes have been observed during the time period October 2016 to July 2017. But these are not statistically significant. Hence, the water in this reservoir has no bad effect; and suitable for agriculture, aquaculture. And the nature of Madduvalasa reservoir has been concluded that it is in mesotrophic nature.

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