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STUDY OF WATER QUALITY INDEX IN MELACHINNAYAPURAM POND, VIRUDHUNAGAR DISTRICT

Zoology

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ABSTRACT

Water is one of the most essential constituents of the environment. All living organisms on the earth need water for their survival and growth. Therefore, it is vital to preserve water. The present study was intended to calculate water quality index in order to determine the quality of water for various purposes and public consumption.This study was dealt with the influence of environmental parameters on the water quality of the selected waterbody, Melachinnayapuram pond. Water quality index (WQI) is valuable and unique rating to depict the overall water quality status and communicates water quality information to the public and legislative decision makers. In this study, various physico-chemical parameters were analysed such as temperature, pH, total dissolved solids, biological oxygen demand, dissolved oxygen, total hardness, chlorinity, alkalinity, salinity and free carbon-di-oxide and WQI was calculated using Weighted Arithmetic Index method.

KEYWORDS

Physico-chemical parameters, WQI, Weighted Arithmetic Index method

INTRODUCTION:

Water is one of the most essential constituents of the environment. All living organisms on the earth need water for their survival and growth. Earth is the planet having about 70% of water. But due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity, the water is highly polluted with different harmful contaminants. Less than 1% water is present in ponds, lakes, rivers, dams, etc., which is used by man for industrial, domestic and agricultural purposes (Sargaonkar and Deshpande, 2003). Therefore, it is necessary that the quality of water should be checked at regular time interval, because due to use of contaminated water, human population suffers from varied water borne diseases. It is difficult to understand the biological phenomenon because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro-biological relationship (Basavaraj Simpi *et al.,*2011).

Water quality in an aquatic ecosystem is determined by many physical,chemical and biological factors. The term water quality was developed to give an indication of how suitable the water is for human consumption (Vaux, 2001). The most convenient way to express the quality of water resources for consumption the water quality index (WQI), using the water quality data being very useful for the modification of the policies (Choudhury and Mamum, 2006).

Water quality assessment includes the use of monitoring to define the condition of water, to provide the basis of detecting trends and to provide the information enabling the establishment of cause-effect relationship. The present study was focused on Mela chinnayapuram pond. In the present study, the main reason for the assessment of quality of aquatic environment is to verify whether the observed water quality is suitable for intended use. The overall process of evaluation includes physical and chemical nature of water in relation to natural quality, human effects and intended uses, particularly the uses which may affect human health and health of the aquatic ecosystem is termed as water quality assessment (Anitha *et al*, 2012).

MATERIALS AND METHODS:

Study area

The area selected for the present study is Mela chinnaiyapuram pond. It is situated 0.5 km away from Mela chinnaiyapuram.It is nearer by Theerthathotti Ayyanar Temple. The length of area is 90 meters and the water capacity is 25 meters. It covers an area of 60 acres. It is permanent pond. In the present investigation, 3 stations were selected, station A has many vegetations, station B is used for bathing and washing of clothes and station C is used for irrigation purposes. Fish capture is also done during rainy seasons.

The investigation was carried out in Mela chinnaiyapuram pond for a period of three months from December 2017 to February 2018. The sample was collected once in fortnights. The various physico - chemical parameters such as temperature, pH, total dissolved solids, biological oxygen demand, dissolved oxygen, total hardness, chlorinity, alkalinity, salinity and free carbon-di-oxide were analysed to check the water quality during the period of investigation. The estimation was done following Dubey and Maheshwari (2005) and Kaur (2007).The weighted arithmetic index method was used for the calculation of water quality index (WQI) of the water body.

RESULTS AND DISCUSSION:

The various physico - chemical parameters such as temperature, pH, total dissolved solids, biological oxygen demand, dissolved oxygen, total hardness, chlorinity, alkalinity, salinity and free carbon-di-oxide were analysed to check the water quality and presented in the graph 1-10. The comparison of WATER QUALITY INDEX IN different stations of various SAMPLEs were given in tables 1-7.The WQI rating of the present study was given based on Qureshimatva *et al.,* 2015.

TABLE:1.WATER QUALITY INDEX IN SAMPLE I

S.NO	STATIONS	WQI
1.	A	72.35
2.	B	102.50
3.	C	110.06
	Total	94.97

TABLE :2. WATER QUALITY INDEX IN SAMPLE II

S.NO	STATIONS	WQI
1.	A	102.59
2.	B	87.38
3.	C	105.93
	Total	98.63

TABLE: 3. WATER QUALITY INDEX IN SAMPLE III

S.NO	STATIONS	WQI
1.	A	86.79
2.	B	87.16
3.	C	87.82
	Total	87.25

TABLE: 4. WATER QUALITY INDEX IN SAMPLE IV

S.NO	STATIONS	WQI
1.	A	86.45
2.	B	108.99
3.	C	131.60
	Total	109.01

TABLE: 5. WATER QUALITY INDEX IN SAMPLE V

S.NO	STATIONS	WQI
1.	A	101.93
2.	B	96.65
3.	C	101.79
	Total	100.12

TABLE: 6. WATER QUALITY RATING AS PER WEIGHTED ARITHMETIC MEAN WATER QUALITY INDEX METHOD

WATER QUALITY INDEX LEVELS	STATUS OF WATER QUALITY
0.25	Excellent water quality
26-50	Good water quality
51-75	Poor water quality
76-100	Very poor water quality
>100	Unsuitable for drinking

(Source: Qureshimatva et al., 2015)

TABLE: 7.ANALYSIS OF WATER QUALITY INDEX (WQI) IN MELACHINNAIYAPURAM POND

SAMPLES	WATER QUALITY INDEX	WATER QUALITY RATING
SAMPLE I	94.97	Very poor water quality
SAMPLE II	98.63	Very poor water quality
SAMPLE III	87.25	Very poor water quality
SAMPLE IV	109.01	Unsuitable for drinking
SAMPLE V	100.12	Unsuitable for drinking
OVER ALL	97.996	Very poor water quality

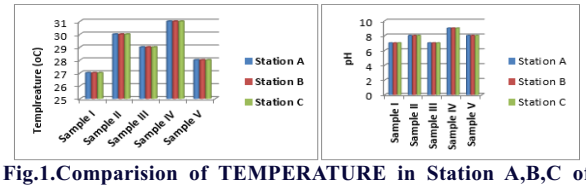

Fig.1.Comparision of TEMPERATURE in Station A,B,C of Sample I,II,III,IV and V

Fig.2.Comparision of PH in Station A,B,C of Sample I,II,III,IV and V

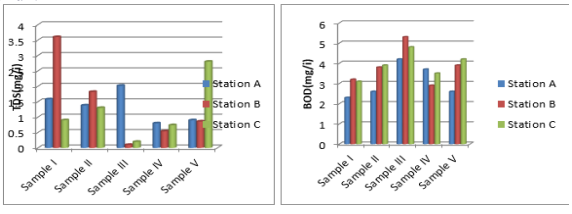

Fig.3.Comparision of TDS in Station A,B,C of Sample I,II,III,IV and V

Fig.4.Comparision of BOD in Station A,B,C of Sample I,II,III,IV and V

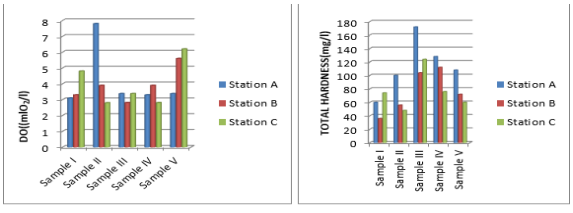

Fig.5.Comparision of DO in Station A,B,C of Sample I,II,III,IV and V

Fig.6.Comparision of TOTAL HARDNESS in Station A,B,C of Sample I,II,III,IV and V

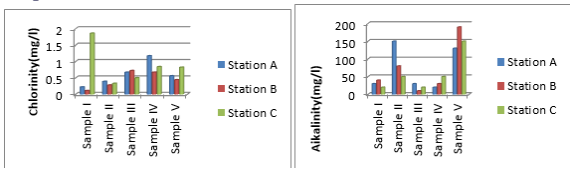

Fig.7.Comparision of CHLORINITY in Station A,B,C of Sample I,II,III,IV and V

Fig.8.Comparision of ALKALINITY in Station A,B,C of Sample I,II,III,IV and V

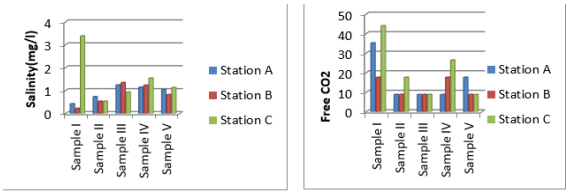

Fig.9.Comparision of SALINITY in Station A,B,C of Sample I,II,III,IV and V

Fig.10.Comparision of FREE CARBON DI- OXIDE in Station A,B,C of Sample I,II,III,IV and V

Therefore, the Water quality index is helpful in assessment and management of water quality. Water Quality Index (WQI) is a single value indicator to the water quality. Water quality index (WQI) may be defined as a quality rating factor reflecting the composite influence on the overall quality of a number of water quality parameters. The extent of pollution can be assessed by means of water quality index. A water quality index provides a single number that expresses overall water quality based on several water quality parameters. The baseline data generated in these investigations and their analysis and interpretation will go a long way in improving our understanding and knowledge base about the status of water quality. WQI value is a measure of pollution load. WQI-100 reveals that the water is polluted and unsuitable for the human consumption (Gangwar *et al.,* 2013). According to these criteria, the quality of Melachinnayapuram pond is reported very poor and unfit. Based on observed WQI results it can be concluded that effective treatment measures are urgently required to augment the water quality of Melachinnayapuram pond by defining an appropriate water quality management plan which in turn will support any future plan for sustainable restoration of water (Elham *et al.,* 2017).

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