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Evaluation Of Water Quality Based On Physical Parameters In The Study Sites Of Bharathapuzha River,Palakkad District,Kerala

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Abstract

The demand of freshwater is rising exponentially over the years to meet the ever increasing human needs for drinking, agriculture and industries. Water quality has immense influence on the sustenance of the biotic components in it as well as those supported by it. The evaluation of water quality is done in terms of physical parameters such as turbidity, pH, electrical conductivity, total dissolved solids and total hardness in the three sites i.e. Lakkidi, Akalur and Athirkkad of Bharathapuzha, a major river of Kerala. By looking each of the parameters there is only a slight variation in the value during the study period in the three sites. But all are within the acceptable limit. The study revealed that water quality of the river is good and less polluted. There is a need for increased education and awareness programs to improve the conservation needs and profile of the Bharathapuzha river system.

Keywords: Lakkidi, Akalur, Athirkkad, Bharathapuzha, physical parameters.

Introduction

Fresh water biodiversity is very important with tremendous social, economic and environmental impacts. River plays pivotal role in water cycle, nutrient cycle, maintaining the delicate balance of aquatic food chain, purification of water, recreation and control of infectious organisms. The Bharathapuzha river is one of the major rivers of Kerala, which originates from the Northern and Southern tips of the Palakkad gap in the Western Ghats. The four major tributaries of the river include Gayatripuzha, Chittoorpuzha, Kalpathipuzha and Thoothapuzha. Bharathapuzha river is the 2nd longest (209Km) and largest (annual discharge of 3.94 Km ^{3}) among the west flowing perennial rivers in the state of Kerala (Raj and Azeez, 2010), as well as the river with most extensive basin area, second in length and third in yield by thousand million cubic feet.

The demand of freshwater is rising exponentially over the years to meet the ever increasing human needs for drinking, agriculture and industries. Water quality has immense influence on the sustenance of the biotic components in it as well as those supported by it. The evaluation of water quality is done in terms of physical parameters such as turbidity, pH, electrical conductivity, total dissolved solids and total hardness of the samples. The study is beneficial to understand the status of water quality and to take remedial measures if any to prevent pollution of water at the source.

Methodology

The study sites for water assessment include Lakkidi, Akalur and Athirkkad of Bharathapuzha river. Turbidity can be measured by Nephalometer in NTU (Nephalo Turbidity Unit). The pH of river water is measured by pH meter. Electrical conductivity is measured using a conductivity cell consisting of a pair of Pt electrodes. Total dissolved solids is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. TDS rate determined as residue left after the evaporation of the filtered sample. The estimation of total hardness is based on complexometric titration using ethylene diamine tetra acetic acid (EDTA).(Manjula and Unnikrishnan,2019).

Result and Discussion

The result analysis of various physical parameters of water samples from Bharathapuzha River were done. There is variability observed between the sampling sites with respect to certain parameters which can be attributed to locational aspects and human interferences. The acceptable limit of turbidity is 1 NTU. Turbidity was found to be in the range of 0.3-15 NTU. The highest value was at Lakkidi during the month of June. This increase in turbidity is caused by slit, mud, plant pieces etc. (Table-1, Graph-1). The range of electrical conductivity (EC) is 382-446 us/cm. The highest value was at Athirkkad during the month of June. The lowest value observed at Akalur. (Table-1, Graph-2). The optimum pH for river water is round 7.4. The acceptable limit is 6.5 to 8.5. The range of pH lies between 7.3-7.6. In the present study a narrow variation of pH is observed for all sampling stations. The character of water was alkaline. (Table-1, Graph-3).

Total dissolved solids acceptable limit is 500mg/l. TDS found to be in the range of 213.9-343.42 mg/l. The highest value observed at Athirkkad in June. The increased value due to the sewage disposal. The lowest value observed at Akalur. (Table-1, Graph-4). For measuring total hardness, water containing calcium carbonate at concentrations below 60 mg/l is generally considered as soft; 60-120 mg/l, moderately hard; 120-180 mg/l, hard; and more than 180 mg/l, very hard. The acceptable limit is 200mg/l. The range of total hardness lies between 112-148.4mg/l. Here the water is hard at Athirkkad in the three months. (Table -1, Graph-5).

These findings agreed with the findings of Manjula and Unnikrishnan (2019) and Priya and Lakshmi (2020). Similar observations were also reported by Jaya and Deepthi (2015), Divya and Manomani (2013), Jalal and Kumar (2013), Anitha *et.al*., (2014) and Sreekesh *et.al*., (2018).

Table 1: showing physical analysis of water samples from the sites in Bharathapuzha river

	LAKKIDI			AKALUR			ATHIRKKAD		
MONTH	MARCH	APRIL	JUNE	MARCH	APRIL	JUNE	MARCH	APRIL	JUNE
TURBIDITY(NTU)	0.3	2.5	15.7	1	1	13.4	0.6	2.5	10
ELECTRICAL CONDUCTIVITY(us/cm)	421	434	423	430	382	417	424	422	446
PH	7.4	7.2	7.5	7.4	7.2	7.3	7.4	7.3	7.6
TOTAL DISSOLVED SOLIDS(mg/l)	235	243	325.71	240.8	231.9	321.09	237.4	236.3	343.42
TOTAL HARDNESS(mg/l)	139.9	137.8	116	148.4	144.1	112	144.1	148.4	126

Fig 1: Graph showing variations in turbidity for different stations of Bharathapuzha River

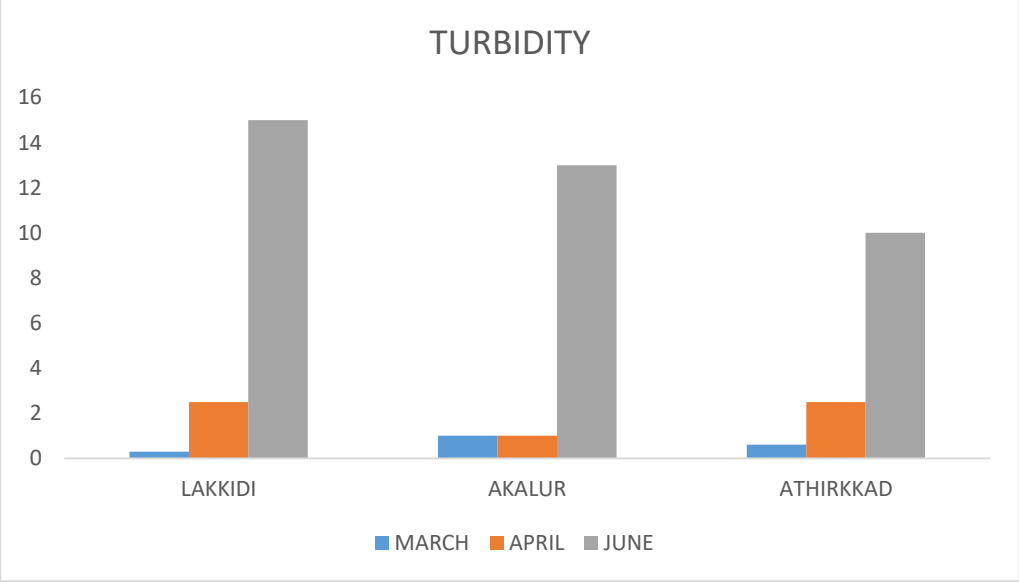


Fig 2: Graph showing variations in electrical conductivity for different stations of Bharathapuzha River

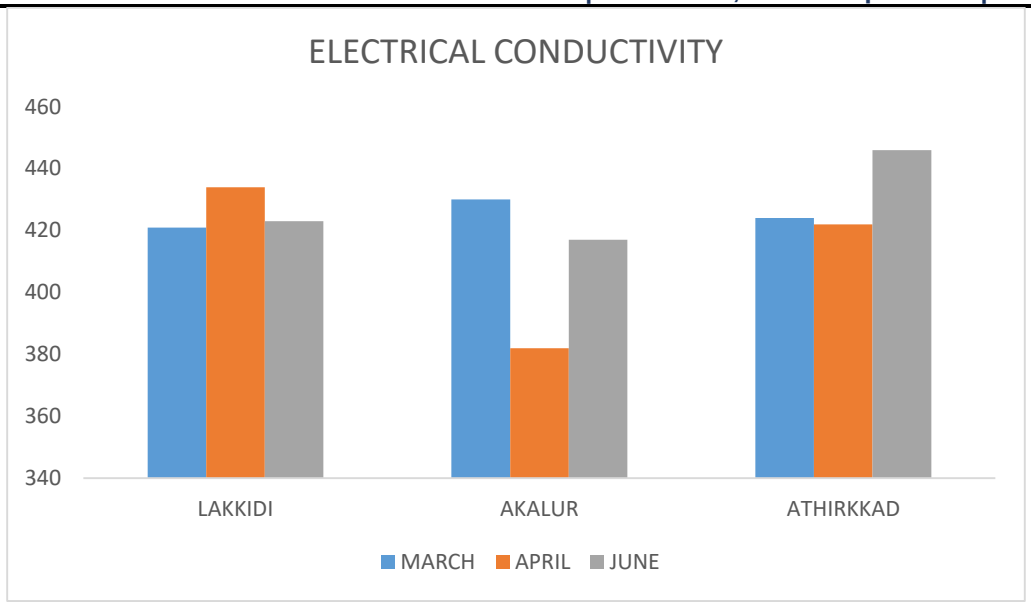


Fig 3: Graph showing variations in pH for different stations of Bharathapuzha River

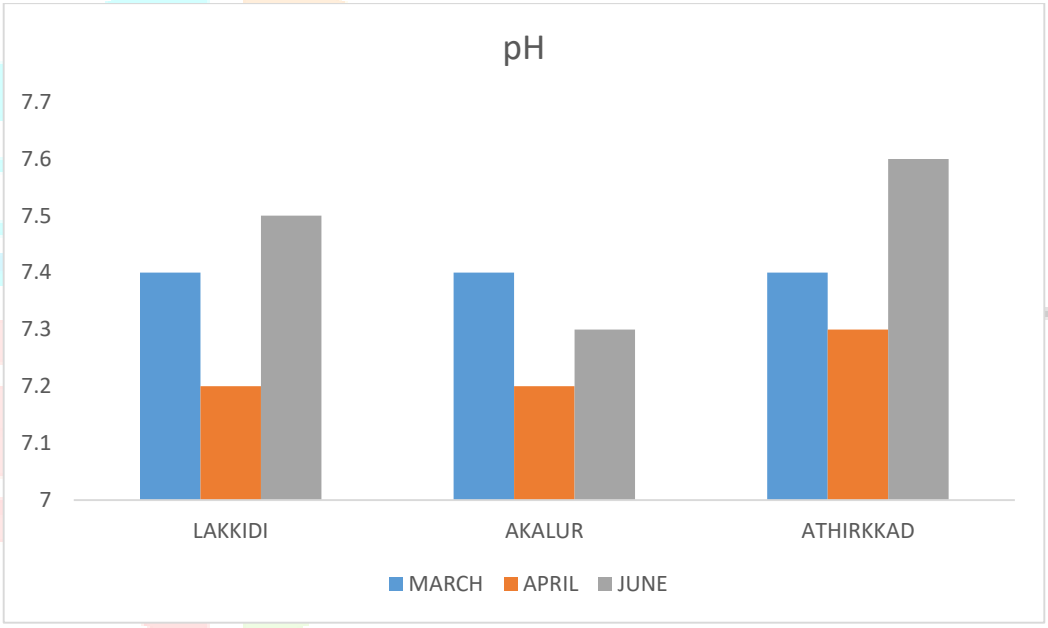


Fig 4: Graph showing variations in total dissolved solids for different stations of Bharathapuzha River

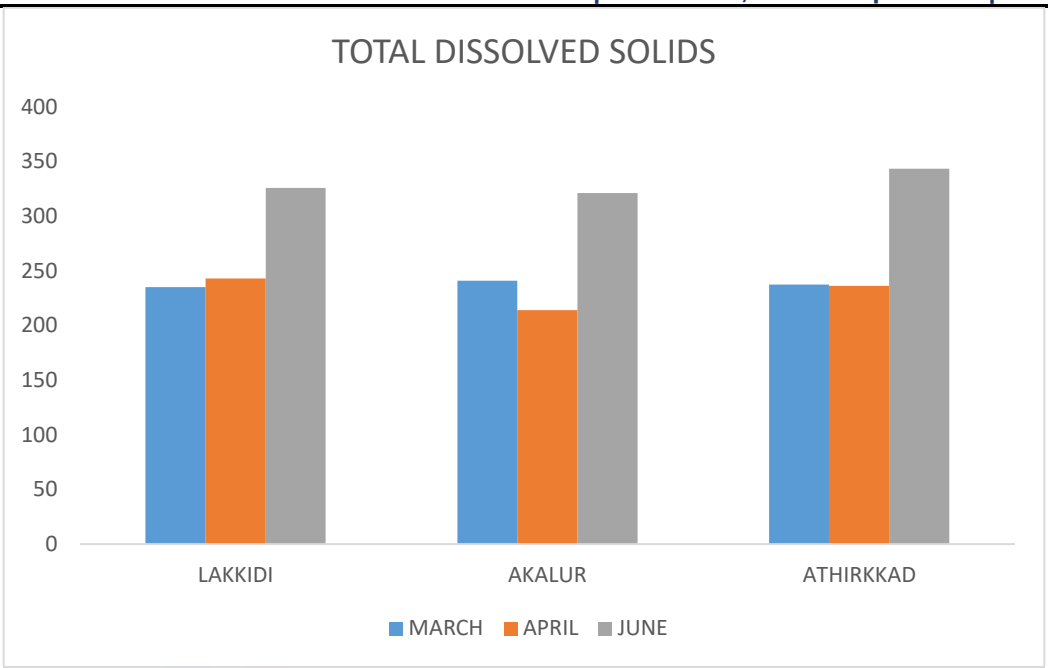
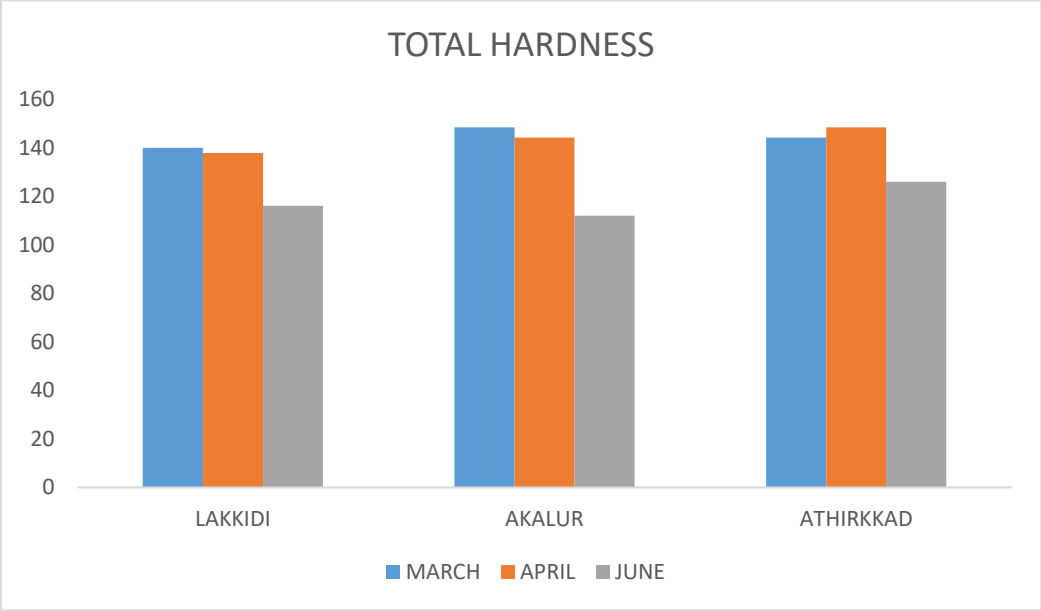


Fig 5: Graph showing variations in total hardness for different stations of Bharathapuzha River



Conclusion

Analysing the physical parameters of the three sites, slight variations were observed in the values during the study period. But all are within the acceptable limit. The study revealed that water quality of the river is good and less polluted. There is a need for increased education and awareness programs to improve the conservation needs and profile of the Bharathapuzha river system.

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