



Assessment of Water Quality Index of Sulur Pond, Coimbatore-Tamilnadu India

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ABSTRACT

Considering the impacts of Industrial effluents on the water quality of many ponds, lakes, reservoirs and rivers as reported in the literature, the present study of water quality of a polluted pond was undertaken. Several Physico-Chemical parameters of the polluted pond river Noyyal connected namely Sulur pond at Coimbatore district were analyzed to evaluate its suitability for public use. Many methods of water quality determination have been discussed. A simple but useful index is the National Sanitation Foundation-water quality index (NSF-WQI). This index can be calculated by determines only eight Physico-chemical Parameters like DO, P^H, BOD, Total phosphate, Nitrates, TDS, Turbidity and Faecal coliforms. The water quality of the pond was found to be medium.

Key words: *Physico-chemical parameter, Water quality, River Noyyal, Sulur pond, anthropogenic pollution*

INTRODUCTION

The availability of water on earth surface has made existence of life, which is major natural gift for life. An indisputable and inseparable bond exists between fresh water bodies and human beings. They are the prime source of water for drinking, irrigation, other domestic purpose and aid in ground water recharge. Rapid industrialization, urbanization and other anthropogenic activities are responsible for contamination of fresh water bodies. The quality of fresh water bodies getting vastly deteriorated due to unscientific waste disposal, improper water management and carelessness towards environment. About 80% water pollution occurs due to domestic waste according to WHO. This has led to scarcity of potable water affecting the

human health¹. Therefore, the continues and periodical monitoring of water bodies for water quality is necessary.

STUDY AREA

The river Noyyal is the tributary of the Cauvery, a large interstate river which cuts through the states of karnadaka and Tamilnadu and enters the Bay of Bengal. It flows through Coimbatore, Tripur, Erode and Karur district. The Noyyal river basin covers a total area of 3510km². The length of Noyyal River about 170 km from west to east. The average width of the basin is 25km. The annual rainfalls varied for this basin. A Noyyal is a seasonal river, which has good flow during the north-east and south-west monsoons. Apart from the monsoon periods, there only scanty flow for

most part of the year. The river supplies water to several irrigation tanks located in and around Coimbatore city and downstream.

The Sular pond is freshwater pond situated in sular town panchayath, 25km east of Coimbatore city. The pond receives water from the catchment areas of Western Ghats through river Noyyal during rainy seasons. The total depth of the pond is 13.05 feet and an area of about 0.480sqkm. The total water holding capacity of the pond is 32.21million cu.ft. Nearly 750 acres of sular village gets irrigation facilities from the pond⁵. The present study has been carried out to evaluate the water quality characteristics of river Noyyal connected Sular pond at Coimbatore using water quality index (WQI) method.

MATERIALS AND METHODS

Sampling of river Noyyal (source) and pond water was carried out from November-2012 to April-2013. Water samples were taken monthly for analysis, and after determining field parameters, they were kept in dark in a cool box before being transported to a laboratory for quantification of the other parameters. For physico-chemical and biological examination, different methods of collection and handling were adopted following the standard procedure (APHA 1995). The instruments were used of precise accuracy and chemicals used were of AR grade.

PH was measured using Digital pH meter. DO and BOD was measured using Winkler's titrimetric method. The multiple-tube fermentation method was used to determine the bacteria present. The confirmed and complete test was carried out for the samples by using the nutrient froth. The turbidity was measured by using Digital Turbidity meter, 863D 'Bio-Chem make. The evaporation method is used for determining the total solids by using standard procedures. Nitrate ion was determined using Brucine method. To determine the total

phosphorus stannous chloride method is used by following the established procedure (APHA 1995).

RESULT AND DISCUSSION

The results of physico-chemical and biological characteristics of the samples are given in Tables 1 (source) and 2 (Sular pond) along with the respective WQI value and graphically represented in Fig 1-8. The water quality index was calculated using the eight parameters (8).

The eight resulting values were then added to an overall WQI (Magudeswaren, 2004).

WQI=0.19 DO+0.18 FC+0.12 pH+0.12BOD+0.11
Total phosphate+0.11
Nitrates+0.09Turbidity+0.08 Total solids.

Water quality index (WQI) is regarded as one of the most effective way to communicate water quality. The water quality index was calculated using NSF information software (Ramakrishnaiah 2009) and compared with standard water quality rating as given in Table 3. The index value ranged from a minimum of 89.82 during the month of March and reached a maximum of 93.40 during the month of November at river Noyyal (source). But in river Noyyal connected Sular pond show an index value ranged from a minimum of 50.70 during the month of March and reached a maximum of 60.28 during the month of November. According to the water quality rating values of 0-25 (very bad), 25-50 (bad), 50-70 (medium), 70-90 (good), and 90-100 (excellent). The water quality of the river Noyyal under study is rated as good during March remains in an excellent state during the remaining months. Similarly the water quality of the river Noyyal connected Sular pond under study is rated as bad during March but remains in a medium state during the remaining months. The water quality is usually intact but occasionally endangered. In the study, the physic-chemical characteristics of river Noyyal (Source) andSular

pond water samples were estimated and the water quality of NSF was evaluated. The conditioning of Sulur pond in it often deviates from the normal levels.

PH is a measurement of the acidity or basic quality of water. In Sulur pond the result of pH in between 7.7-8.20 indicates the pond water is alkaline. DO is the important parameters in assessing water quality and reflects the physical and biological processes prevailing in water⁶. Percent saturation oxygen is an indicator of taste and life of Aquarium. There exists no better general indicator of water quality level than DO (Huge and Ellis 1987). The % DO in the pond was found between 75% and 84% during the month of April and November respectively.

BOD of water samples collected from the Sulur pond ranged from 3.4-5.2 mg/l. High level BOD

indicates high organic load in surface water which depletes oxygen for its oxidation process. A measurement of turbidity of water is useful in monitoring proper filtration and to determine the effectiveness of treatment process with different dosages of chemicals⁸. In the pond the turbidity of water was found ranging between 55 and 80NTU. These values are not well within limits IS: 10500, indicating the pollution.

The water samples collected from the Sulur pond were found to have a faecal coliforms ranging from 165-235 MPN/100ml. TDS, phosphates and nitrate values of the Sulur pond water sample ranged between 630-834 mg/l, 1.8-2.8mg/l and 3.00-5.2mg/l respectively. Thus the pond water is not safe for drinking with respect to faecal coliforms, phosphate and nitrates.

Table 1: Physico-chemical Characteristics of the river Noyyal at source from Oct.2012-April 2013

S.no	Parameters	Units	November	December	January	February	March	April
1	DO	% saturation	96.50	96.30	95.50	95.00	93.50	94.50
2	FC	MPN/100ml	2.00	2.00	3.00	3.00	4.00	4.00
3	pH	pH units	6.90	6.90	6.80	6.80	6.70	6.85
4	BOD	mg/l	0.50	0.50	0.55	0.60	0.78	0.65
5	P	NTU	0.20	0.20	0.25	0.32	0.25	0.20
6	N	mg/l	0.25	0.25	0.30	0.35	0.48	0.35
7	Turbidity	NTU	2.00	2.00	2.50	1.80	2.50	2.00
8	TDS	mg/l	65	95	88	82	85	88
Overall WQI			93.40	93.15	91.25	90.49	89.82	90.98

Table 2: Physico-chemical Characteristics of the river Noyyal connected Sulur pond from Oct.2012-April 2013

S.no	Parameters	Units	November	December	January	February	March	April
1	DO	% saturation	84	82	80	78	76	75
2	FC	MPN/100ml	165	172	190	203	215	235
3	pH	pH units	7.70	7.80	7.80	7.9	7.9	8.2
4	BOD	mg/l	3.4	3.6	4.0	4.2	4.6	5.2
5	P	NTU	2.5	2.3	2.0	1.8	2.5	2.8
6	N	mg/l	3.00	3.20	3.40	4.00	4.5	5.2
7	Turbidity	NTU	55	60	67	72	77	80
8	TDS	mg/l	834	800	765	630	700	740
Overall WQI			60.28	59.07	57.78	55.46	50.70	51.02

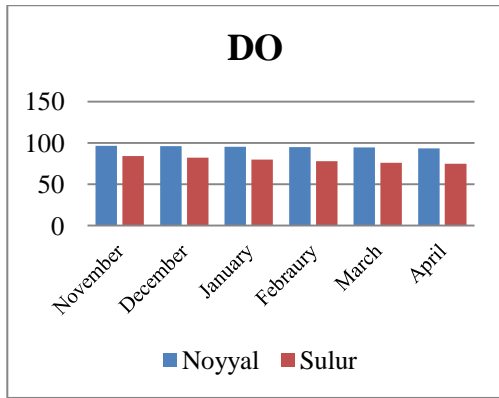


Fig 1: DO values of river Noyyal and pond from Nov-April

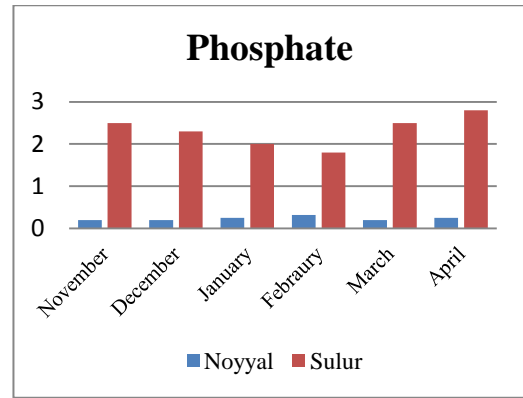


Fig 4: Phosphate values of river Noyyal and pond from Nov-April

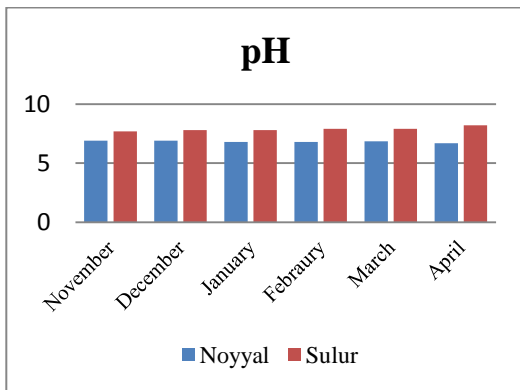


Fig 2: pH values of river Noyyal and pond from Nov-April

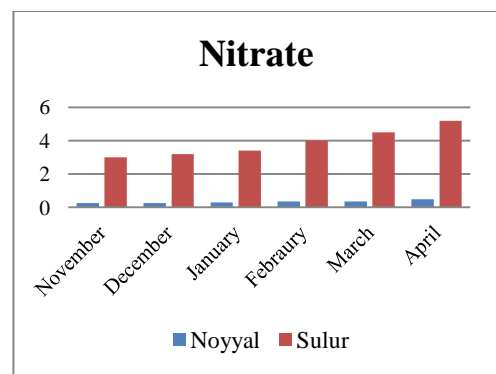


Fig 5: Nitrate values of river Noyyal and pond from Nov-April

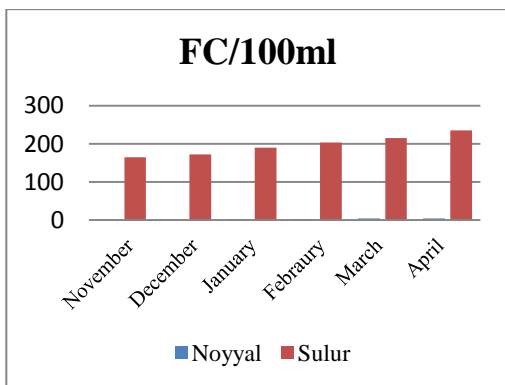


Fig 3: FC values of Noyyal and pond from Nov-April

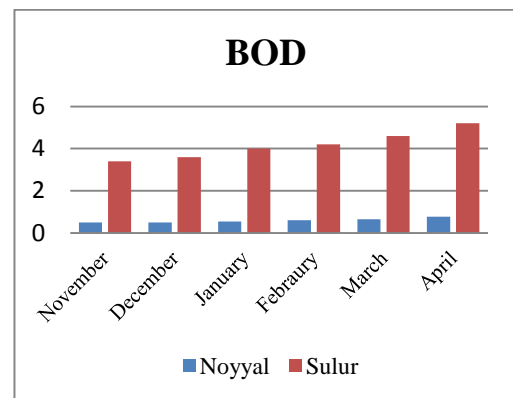


Fig 6: BOD values of river Noyyal and pond from Nov-April

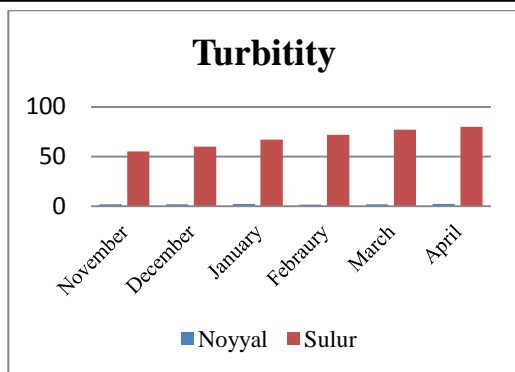


Fig 7: Turbidity values of river Noyyal and pond from Nov-April

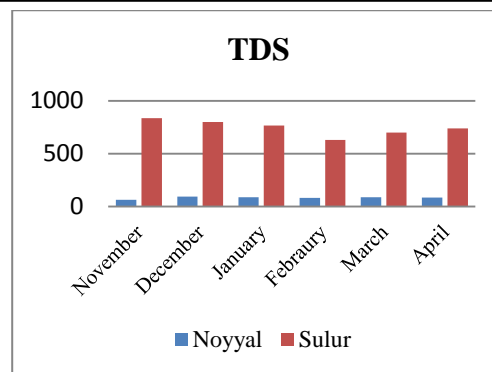


Fig 8: TDS values of river Noyyal and pond from Nov-April

Table 3: Water quality index of the pond water

Water Quality Index	Rating
90-100	Excellent
70-90	Good
50-70	Medium
25-50	Bad
0-25	Very bad

CONCLUSION

The NSF-WQI serves as a useful tool in water quality monitoring. The study reveals that the water quality index of river Noyyal at source has excellent in most of the months. So the water is suitable for potable purposes. But the water quality index of river Noyyal connected Sular pond has poor quality. So the water is not suitable for drinking purposes. However it can be used for irrigation purposes.

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