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Experimental Studies on the Assessment of River Water Quality: A Case Study on Noyyal River Tirupur

Aswathy V Gopal*, OS Arun, R. Gobinath, D. Saranydevi
Department of Civil Engineering, Jay Shriram Group of Institutions, Avinashipalayam, Tirupur, Tamilnadu, India

Abstract

Tirupur is the most popular textile industrial area, which contains 90% of the knitwear industries in India. By 2005, there were more than 729 bleaching and dyeing units in Tirupur. Now there are 2000 textile manufacturing units producing variety of goods. The textile industries release heavy amount of dye waste which contains bleaching liquids, soda ash, caustic soda, sulfuric acid, hydrochloric acid, sodium peroxide, and so many other toxic materials to river Noyyal. The wastewater is acidic, smells terrible and contains dissolved solids, which increase the biological and chemical oxygen demand in water. With no fresh water available for dilution the groundwater from Coimbatore and Tirupur is no longer suited for irrigation. The dye industries said that the discharge of their industrial effluents to the river Noyyal has stopped. But this study clearly shows the presence of materials that are used in dye production.

Keywords: *Noyyal river, heavy metals, carcinogenic, soil analysis, toxicity*

**Author for Correspondence* E-mail: aswathy.vg13@gmail.com

INTRODUCTION

Noyyal River is a tributary of Cauvery River which rises from Vellingiri hills in Western Ghats, Tamilnadu, South eastern India, and drains into Cauvery River. The river flows through four states: Coimbatore, Tirupur, Karur and Erode in western Tamilnadu. The river basin is 180 km in length and 25 km in width and covers an area of 3500 km^2. The area of cultivated land in the river basin is 1800 km^2. The area is known by its meagre rainfall. The river contains water only in the monsoon season otherwise it will flow by containing the industrial effluents from dyeing and bleaching industries. Till the river reaches Tirupur, the pollution concentration is considerably low. But in the Tirupur area, the rate becomes substantially high due to the textile effluent discharge and sustains downstream up to Orathupalayam dam. The dilution in the river is taking place in the rainy season only. By virtue of this, the river water is totally unfit for irrigation as well as drinking purpose. About 123 ha of cultivable land has become uncultivable due to the soil pollution caused by the textile industries. The high conductivity of Noyyal river water indicates the main parameter which makes the water unfit for irrigation. The total cultivable area in the polluted zone is 146,389 acre, in which 24.7% is injurious, 36.8% critical and 38.5% normal for cultivation [1–5].

Water quality is an important factor to judge environment changes, which are strongly associated with social and economic development. The evaluation of water in the developing countries has become a critical issue in recent years, especially due to the concern that fresh water will be scarce in near future [6, 7].

Water is a finite resource that is very essential for human existence, agriculture, industry, etc. Without any doubt, inadequate quantity and quality of water have serious impact on sustainable development. In developing countries, most of which have huge debt burdens, population explosion and moderate to rapid urbanization, people have little or no option but to accept water sources of doubtful quality, due to lack of better alternative sources or due to economic and technological constraints to treat the available water

adequately before use. Almost all tributaries of major river system are already saturated (and are already declared as Dead Rivers) with pollution. Water pollution is more pervasive than that of land and air pollution. Because of the change in hydrological pattern of the country, pollutants are not flushed out properly and also in the dry period the situation becomes severe. Pollution effects have harmful consequences over environmental resources like water which follows hydrogeologic cycle that encompasses both surface water and groundwater [8].

Interpretation of complex water quality data is difficult to understand and to communicate during decision-making process. Assembling various parameters of water quality data into one single number leads to an easy interpretation of data, thus providing an important tool for management and decision-making purposes. The purpose of an index is to transform the large quantity of data into information that is easily understandable by the general public. Water quality index exhibits the overall water quality at a specific location and specific time based on several water quality parameters. WQI is a set of standards used to measure changes in water quality in a particular river reach over time and make comparisons from different reaches of a river [9–11].

MATERIALS AND METHODS

This study aims to monitor the water and soil quality of Noyyal river, Tirupur, Tamilnadu. For this, the authors selected 25 sampling points along the Noyyal river and took the GPS coordinates for the proper mentioning and identification of sampling points. In this present study, the authors analyzed both the organic and inorganic parameters of the river water. The tests were conducted as per the IS procedures.

RESULTS AND DISCUSSION

Table 1: *Parameters Showing the Water Quality of Sampling Point 1.*

Sample: 1 GPS location: E:11°06.02` N:077°19.687`		
S. No:	**Parameters**	**Value**
1	pH	7
2	Turbidity	10 NTU
3	Transmittance	97%
4	TDS	3.05 ppt
5	Absorbance	0.01
6	Conductivity	4.77
7	BOD	mg/L
8	COD	800 mg/L
9	Sulfate	280.8 mg/L
10	Sulfide	1.3 mg/L
11	Chloride	1350 mg/L
12	Iron	0.00 mg/L
13	Chromium	3.74 mg/L
14	Cadmium	NTL
15	Boron	0.32 mg/L
16	Magnesium	Nil
17	Ammonia	3.96 mg/L
18	DO	4.6 mg/L

Table 2: *Parameters Showing the Water Quality of Sampling Point 2.*

Sample: 2 GPS location: E: 11°06.008` N: 077°19.760`		
S. No.	**Parameters**	**Value**
1	pH	6
2	Turbidity	10 NTU
3	Transmittance	90%
4	TDS	3.05 ppt
5	Absorbance	0.04
6	Conductivity	4.57
7	BOD	mg/L
8	COD	600 mg/L
9	Sulfate	291.2 mg/L
10	Sulfide	1 mg/L
11	Chloride	3300 mg/L
12	Iron	0.88 mg/L
13	Chromium	1.7 mg/L
14	Cadmium	NTL
15	Boron	0.105 mg/L
16	Magnesium	Nil
17	Ammonia	4.24 mg/L
18	DO	4.6 mg/L

Table 3: *Parameters Showing the Water Quality of Sampling Point 3.*

Sample: 3 GPS location: E:11°05.994` N: 077°19.832`		
S. No:	**Parameters**	**Value**
1	pH	8
2	Turbidity	101 NTU
3	Transmittance	60%
4	TDS	1.17 ppt
5	Absorbance	0.23
6	Conductivity	1.72
7	BOD	mg/L
8	COD	600 mg/L
9	Sulfate	228.8 mg/L
10	Sulfide	3.46 mg/L
11	Chloride	250 mg/L
12	Iron	1.8 mg/L
13	Chromium	5.27 mg/L
14	Cadmium	NTL
15	Boron	0.042 mg/L
16	Magnesium	Nil
17	Ammonia	6.51 mg/L
18	DO	4.6 mg/L

Table 4: *Parameters Showing the Water Quality of Sampling Point 4.*

Sample: 4 GPS location: E:11°05.963` N: 077°19.94`		
S. No.	**Parameters**	**Value**
1	pH	8
2	Turbidity	82 NTU
3	Transmittance	61%
4	TDS	2.06 ppt
5	Absorbance	0.2
6	Conductivity	2.92
7	BOD	mg/L
8	COD	800 mg/L
9	Sulfate	245.44 mg/L
10	Sulfide	4.1 mg/L
11	Chloride	750 mg/L
12	Iron	1.56 mg/L
13	Chromium	5.27 mg/L
14	Cadmium	NTL
15	Boron	0.12 mg/L
16	Magnesium	Nil
17	Ammonia	6.91 mg/L
18	DO	4.6 mg/L

The results clearly indicate the presence of pollution in the Noyyal River. From this study it's found that still some pollution load exists that may be due to present discharge level into the river or may be owing to the pollution load already existing in that area. Also it's suggested to conduct further studies in the water sample during various seasons and if the pollution is found measures may be taken to avoid further pollution. The presence of carcinogenic elements like chromium will be a very big challenge for the environment and for the aquatic life.

CONCLUSIONS

In this study it's found that the present status of the water in the study area is not of good quality and it's polluted due to several factors. It is not only attributed to the pollution due to the industrial discharge, but it may be one of the main parameters and a main pollutant. Various regulatory bodies are acting upon industrial pollution; in spite of their stupendous work the pollution continues to destroy our natural water bodies. Tirupur district being mainly irrigated by this river, avoiding pollution to this river should be the topmost priority which will enhance the livelihood of many farmers relying on this water source. Also detailed study may be done in the water sampling in various seasons to ascertain the pollution load that exists on the Noyyal river during various seasons.

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