



## Water Quality Index of River Cauvery At Erode Region, Tamilnadu, India

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### ABSTRACT

An attempt has been made to study the physico-chemical characteristics and biological investigations of Cauvery river at Erode region. The sampling points were selected on the basis of their importance. Industrial wastewater, dyeing effluents and sewage are allowed to mix with the Cauvery river water in this region. Water Quality Index (WQI) has been calculated based on National Sanitation Foundation (NSF) index system. Water Quality Index is an easy tool to assess the quality of surface waters and to control the pollutional load of water bodies.

### INTRODUCTION

The Cauvery river is one of the important interstate rivers of the country. It originates at Thalai Cauvery in Karnataka. The Cauvery basin extends over an area of 87,900 sq. km in the states of Kerala, Karnataka and Tamilnadu. The total length of the river from its origin to its confluence into the sea is 800 kms of which about 320 kms are in Karnataka, 416 kms in Tamilnadu and the remaining of 64 kms forms the common boundary between the states of Karnataka and Tamilnadu. In Tamilnadu, the Cauvery river has three tributaries viz. Noyyal, Bhavani and Amaravathi. The Cauvery river and its tributaries pass through important urban centres of Coimbatore, Mettur, Erode, Tiruchirapalli and Kumbakonam. Industrial activities in these towns are varied and many.

The Cauvery river flow depends on seasonal rains, which has been observed to be low. Besides industrial effluents, the domestic and agricultural run off are also freely allowed to mix with the river water. Consequently, the quality of water in the Cauvery river has to be monitored and assessed periodically.

The present study has been carried out to evaluate the water quality characteristics of Cauvery river in the Erode region by using Water Quality Index (WQI) which helps the common man to understand the quality of water.

### MATERIALS AND METHODS

The water samples from Cauvery river were collected from six stations, one at Paalikadu, before Mettur Dam when Cauvery passes after Hogenakkal. This sampling station could be considered as 'source point'. The other five stations were selected considering their industrial and human activities which affect the quality of water. They are Mettur Dam, Mettur (Cauvery Cross), B.P. Agraharam, Pallipalayam and Parisalthurai. The samples were collected from all the stations at 10 a.m. For chemical, biological and microbiological examination, different methods of collection and handling were

adopted, following the standard procedures (APHA 1998). The instruments used were calibrated, accurate, and chemicals used were of AR grade. The parameters and methods adopted for the above examinations of water are detailed on Table 1. Water Quality Index has been calculated for the water samples collected on the basis of the results of chemical and biological investigations.

## RESULTS AND DISCUSSION

The physico-chemical and biological characteristics of the samples are given in Table 2 along with the respective WQI value. The water quality index was calculated by employing widely accepted and used National Sanitation Foundation (NSF) water quality index scale of 100 point that comprises of results from a total of nine different parameters.

The nine resulting values were then added to arrive at an overall WQI.

$WQI = 0.17 DO + 0.16 FC + 0.11pH + 0.11 BOD + 0.10 \text{ total phosphate} + 0.10 \text{ nitrates} + 0.08 \text{ turbidity} + 0.07 \text{ total solids} + 0.01 \text{ temperature change}$

Dissolved oxygen plays a major role in water quality determination. The introduction of oxygen demanding materials, either organic or inorganic, into a river causes depletion of the dissolved oxygen in water. This poses a threat to fish and other higher forms of aquatic life. There exists no better general indicator of water quality level than DO (Huge Ellis 1987).

It was found that the DO was maximum at station 1 and decreased steadily until station 6. This may be attributed to the addition of bleaching and dyeing effluents containing oxidisable organic matter and consequent biodegradation and decay of vegetation which leads to the consumption of oxygen present in water (Jammel 1998). A low % saturation of DO has direct effect on fish community during spawning period because the respiratory system requires DO to breath.

A slight variation of pH value from station 1 to 6, i.e., 7.39 to 7.79, which tend to be alkaline, is due to mixing of industrial wastewaters into the stream. The total solids are important parameter for drinking water and also used for other purposes. From station 1 to 6, the total solids value was found to be in the range of 236 to 290 mg/L. The permissible limit of total solids for drinking water is 1500 mg/L.

BOD was low at station 1 and higher at station 6. The faecal coliforms as MPN reach a moderate value of 400/100 mL. The causes of high BOD at high faecal coliform values are owing to letting out of domestic sewage and dyeing effluents directly into the river water.

The concentration of nitrates and phosphates in the water from station 1 to 6 indicated a steady increase. The nitrates vary from 2.5 to 6.2 mg/L, and phosphates from 0.05 to 0.60 mg/L. The nitrate concentration if exceeds 45 ppm, it would drastically affect health of infants which may lead to 'blue baby disease'. The increase in phosphate concentration at the river stream is due to agricultural run off and human activities.

The turbidity in water is caused by suspended matter such as clay, salt, finely divided organic and inorganic matter, soluble coloured organic compounds and plankton and other organisms. From station 1 to 6, the turbidity value fluctuated between 0.8 and 1.4 NTU, which is within the permissible limits.

Temperature is a critical water quality and environmental parameter because it controls the kinds and types of aquatic life, regulates maximum DO concentration of water and influences the rate of chemical and biological reactions. Seasonal variations in stream temperature may be caused by number

Table 1: Parameters and methods for water examination.

S.No.	Parameters of water analysis	Methods
1.	Dissolved Oxygen, DO ppm	Winkler's titrimetric method
2.	Faecal Coliform, MPN/100mL	Multiple tube fermentation method
3.	pH in standard units	Electrometric method
4.	Biochemical Oxygen Demand, BOD, mg/L	Oxygen difference method
5.	Phosphate, mg/L	Stannous chloride method
6.	Nitrates, mg/L	Brucine method
7.	Total solids, mg/L	Gravimetric method
8.	Turbidity, NTU	Nephelometric method
9.	Temperature °C	1/10 °C sensitive thermometer

Table 2: Physico-chemical and biological characteristics of River Cauvery.

S.No.	Test Parameter	Paali-kadu (1)	Mettur Dam (2)	Cauvery Cross (3)	B.P. Agraharam (4)	Pallipalayam (5)	Parisalthurai (6)
1.	DO, % Saturation	80	73.7	70	72.5	72.5	68.8
2.	Faecal Coliforms MPN/100mL	5	10	10	100	200	400
3.	pH	7.62	7.39	7.46	7.63	7.60	7.79
4.	BOD	1.5	1.6	1.7	3.5	4.3	5.5
5.	Phosphate	0.05	0.07	0.07	0.24	0.54	0.60
6.	Nitrates	2.5	2.5	3.75	4.8	5.5	6.2
7.	Total solids	242	236	245	247	256	290
8.	Turbidity, NTU	1	0.8	1	1	1.4	1
9.	Temperature Change (°C)	0.5	0.3	0.3	0.3	0.5	1
10.	Water Quality Index	88	86	83	78	68	66

All values are in mg/L except pH and WQI otherwise stated.

of factors and a change in temperature affects aquatic life. WQI calculation based NSF system placed weightage to change in temperature factor too.

The Water Quality Index value indicated a large dip from station 1 to 6, i.e., 88 to 66 in the beginning of rainy season (August 2008). According to WQI (NSF) legend, the water which has the quality characteristics value between 70-90 is good and 50-70 is medium. These values have revealed the quality of water from Mettur dam to Parisalthurai, a stretch of 70 kms has undergone a drastic change. A sudden fall in water quality at station 3 to station 4 and 5 is largely due to tannery and textile effluents being channelised into Cauvery river through Chunnambu Odai in B.P. Agraharam and Pallipalayam. Sampling station 6 has still poor quality because of added pollutants from domestic wastewater in and around Erode.

## CONCLUSION

The Cauvery river, which enters into Tamilnadu at Hogenakkal, flows across Mettur, Pallipalayam, Erode and Kodumudi, presented a perceptible change in its water quality in this stretch. A slow definite decrease in WQI values indicates that the river water has been polluted by industrial efflu-

ents, textile waste water, human activities and agricultural runoff. The study has been carried out in August 2008, when the river had copious flow of water. It is expected that during summer season when there will be a diminished level of water, pollutional load would be higher and the quality of water may not be suitable for domestic and civic purposes. The State Government and State Pollution Control Board may initiate necessary steps to prevent pollution of river water and to preserve its life sustaining quality throughout the year.

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