

# **ASSESSMENT OF PHYSICO-CHEMICAL CHARACTERISTICS OF SELECTED STUDY AREA OF CAUVERY BASIN**

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**Abstract-** The most important resource of human kind are rivers. In recent years, pollution has become a major concern due to rapid urbanization. The surface water quality suffers increasingly due to degradation caused by industrial, domestic and agricultural activities. The study area focuses on Cauvery river basin flowing in Mandya district. The water samples are collected from selected sampling stations which are previously chosen by pollution control authorities and a comparison between the previous years results to the present day study carried out in 2019 is made. The physical and chemical characteristics like pH, DO, BOD and Total Coliform are tested for the collected samples. The toxic effluent load due to anthropogenic activity in the sampling locations viz., KRS Backwaters, Karekura, Srirangapatna, T Narasipura, Mahadevpura and Bannur sampling stations are found to be high due to human activities. In the study assessment of river water quality and identification of possible sources of pollution is done. The study also attempts to identify the sources and causes of Cauvery river pollution, locate point and non-point sources of pollution for the study area and suggest possible remedial measures to reduce the river pollution.

**Keywords –** Cauvery River, point source pollution, water quality, Coliform, DO, BOD

## **1. INTRODUCTION**

The Cauvery River is one of the major rivers in the south India and is also termed as “Dakshina Ganga”. It is an interstate river extending over states of Karnataka, Tamil Nadu, Kerala and union territory of Pondicherry and is fourth largest river in the southern India. River Cauvery originates in the Brahmagiri hills of Western Ghats in Kodagu district of Karnataka. It leaves the mountain regions of Karnataka to enter Mandya district through KRS dam. Further it continues its flow from KRS reservoir east wards to enter Srirangapatna. The water quality management is one of the many challenges for natural resource management. Increasing demand of water for human consumption, irrigation and growing industrial activities has impacted the water quality of rivers. Water quality monitoring is an important exercise, which helps in evaluating the nature and extent of pollution control required, and effectiveness of pollution control measures already in existence. It also helps in drawing the water quality trends and prioritizing pollution control efforts.

The river receives untreated domestic and municipal sewage from illegal discharges and by anthropogenic activities. The discharge from dyeing units, sugar mills are majorly contributing to high BOD levels in this river. DO was maximum in Ranganathittu sample and was found to be minimum in pump house sample. Highest level of Phosphate was recorded at T.Narasipura (6.8mg/l) and the Bannur sample showed the minimum concentration (0.9mg/l). It is identified that Cauvery river stretch from Ranganathittu to Bridge of Srirangapatna about 50km length with 4 mg/l BOD (Appaji Gowda et al. (2016). Huge irrigation, agricultural and industrial basin around the dam and Cauvery river is seen. The study was performed in nine stations – KRS Dam, Reservoir, dam Gate. Near dike of garden, first bridge after dam, Balmuri, Birds sanctuary, Srirangapatna Bridge, Sangama/ Nimishamba Temple. The results showed the lead concentration was observed in the range of 19.19% to 28.9% in the carbonate fraction, whereas in the oxides of iron and manganese oxide it was 26.01% to 40.96. Susheela et al., (2015). It was assessed that the impact of municipal waste-water on expanse of river Cauvery at 12 locations for about 2.5km which extend from the upstream of municipal sewer discharge point near the fort of Srirangapatna up to Sangama. They have analyzed physicochemical parameters during the month of April, 2011 (low flow conditions- summer) and May, 2011 (high stream flow-pre-monsoon). From the study it was found that DO variation form 2.61-6.57 mg/l during low flow conditions and 3.016-8 mg/l during high stream flow, COD varied from 22.2-170.77 mg/l during summer and 21.04-80.77mg/l during pre-monsoon, BOD varied from 0.88-10.65 mg/l during summer and 1.026-20.66 mg/l during pre-monsoon, phosphate and nitrate were reported to be in range of 0.74-1.69 mg/l and 0.24-0.32 mg/l during summer respectively and during pre-monsoon it was 0.23-2.63 mg/l and 1.46-1.79 mg/l respectively. Total coliform varied from 400-2800MPN/100ml and 600-2000MPN/100ml during April and May month of sampling respectively.(Ramya et al. (2014)

In the present investigation, the main objective is assessment of the physico-chemical characteristics of Cauvery river basin flowing in the study area. The study helps to understand how the river is getting polluted, identifying polluted stretches of river and its possible point and non-point sources of pollution. The monitoring stations/sampling locations are mapped, and results of water quality analysis is compared to previous year’s water quality results. Suitable remedial measures are suggested to reduce river pollution and control its adverse impac .

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## 2. OBJECTIVE OF STUDY

Objective of the study is to check the pollution concentration levels of Cauvery River and to understand the physio chemical changes caused due to point and non-point source pollution.

## 3. STUDY AREA

River Cauvery leaves the mountain regions of Karnataka to enter region of Mysore, Mandya district through KRS dam. Further it continues its flow from KRS reservoir east wards to enter Srirangapatna. As Mandya district is one of the most fertile districts of the state, agriculture is one of the main occupation. Different sources tapping the surface water and ground water plays an important role in irrigating and hence pollution from irrigation water to the surface water resources is a nonpoint source of pollution. Among point source include the industries and other contributors of pollution to the surface waters .The water quality monitoring stations were identified along the Cauvery basin at 7 locations KRS Back waters, Ranganathittu, Srirangapatna, Karekura, Mahadevpura, T Narasipura and Bannur. KRS Backwaters is a tourist spot, Ranganathittu accommodates bird sanctuary along the Cauvery River Karekura is a village located in Srirangapatna taluk of Mandya district. Srirangapatna is town with historical significance and with medium population. It has floating population since it has many famous monuments, temples and places of visit as a tourist destination. The Cauvery River flowing in this region is prone to human activities like bathing, washing and waste disposal. River Cauvery In this town divides into two major branches of north and south, there is also another parallel stream to south branch called Paschima Vahini River.

The water quality analysis was carried out by testing selected 7 water quality parameters which included, DO, BOD, COD, pH, Nitrates and Total coliform count These locations were identifies as they have settlements near to the Cauvery river i.e it has both agricultural activity as well as other anthropogenic activities along the river

## 4. FIELD SURVEY AND SAMPLE COLLECTION

As part of this study, a field survey was carried out and river water samples were collected from the locations (Fig.3) and they were tested for the following parameters - Fecal Coliform (mnp/100ml), Total Coliform (MPN/100ml), D.O. (mg/l), B.O.D (mg/l), pH and temperature. The pointers in orange colour indicate the locations where government has collected data for past couple of years and blue being additional data sample points for collection in this study.

Data is collected National Water Quality Monitoring Programme (NWMP) from river water quality monitoring stations of CPCB/KSPCB were collected for years 2001 and 2016 for 7 monitoring stations, respectively. Further field survey was conducted, and water samples were collected from the same 7 locations, including 7 previous locations.

The water samples were analyzed for pH, BOD (mg/L), DO (mg/L), Total Coliform (Most Probable Number, MPN/100ml) as per the standard procedures. A comparison is made between the water quality from these datasets for 2001, 2011 and 2019.

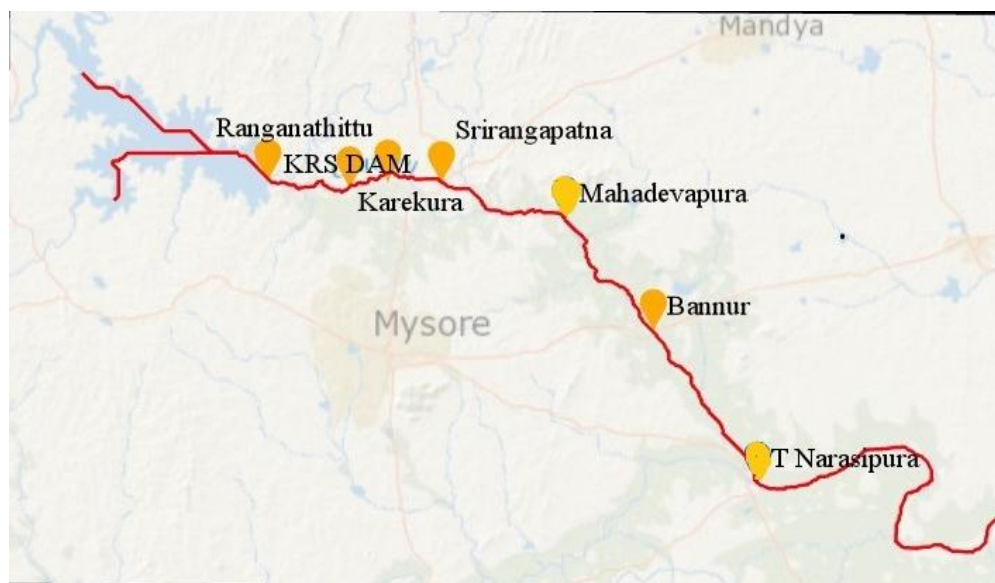


Fig1: Sampling Points

## 5. RESULTS AND DISCUSSION

LOCATION	Parameter - pH		
	2001	2016	2019
KRS backwaters	8.3	8.16	8.4
Ranganathittu	7.99	8.26	8.3

Karekura	8.3	8.20	8.3
Srirangapatna	7.9	7.99	7.9
Mahadevpura	NA	NA	6.5
Bannur	NA	7.93	7.6
T Narasipura	NA	NA	7.8

LOCATION	Parameter – DO (mg/L)		
	2001	2016	2019
KRS backwaters	7.9	6.80	5.5
Ranganathittu	NA	6.44	5.5
Karekura	9	7.05	6.2
Srirangapatna	8	6.10	4.5
Mahadevpura	NA	NA	4.3
Bannur	NA	7.94	4.6
T Narasipura	NA	NA	4.5

LOCATION	Parameter – BOD (mg/L)		
	2001	2016	2019
KRS backwaters	1	1.54	146
Ranganathittu	NA	2.04	16
Karekura	1	1.39	45
Srirangapatna	1	2.63	88
Mahadevpura	NA	NA	784
Bannur	NA	1.9	190
T Narasipura	NA	NA	114

LOCATION	Parameter–TotalColiform (MPN/100ML)		
	2001(<2500)	2016(<2500)	2019(<1.8)
KRS backwaters	3175	1271.25	30
Ranganathittu	NA	3740.50	13
Karekura	3109	1150.75	22
Srirangapatna	2908	5764.25	2
Mahadevpura	NA	NA	8
Bannur	NA	1574.25	7
T Narasipura	NA	NA	10

The results are summarized in the Tables above. There is no much variation in pH concentration, in all sampling stations it is well within desired limit. DO( Dissolved Oxygen) is an important indicator of water quality, below 4 mg/L of DO in water indicates extensive pollution of water body and also it is a threat to aquatic life. In the above mentioned tables comparison between the years show that even though the minimum required 4 mg/L is present but there has been a decrease in the DO levels over the years which indicate increase in the pollution levels of the water body. The DO is marginally just above minimum required limit of 4 mg/L.

BOD (Bio Chemical Oxygen Demand) is the amount of oxygen utilized for degradation of organic matter at a standard temperature.so BOD indicates the organic load in water. BOD is extensively high in the sampling stations and there has been drastic increase in the BOD concentration which clearly indicates high pollution levels of the surface water body.

## 6. CONCLUSION

Based on the overall results, it can be concluded that over the years, river water in this stretch has become highly contaminated, especially in Srirangapatna, Mahadevpura and Bannur sampling stations BOD concentration is high.

Agricultural runoff from agricultural lands containing fertilizers and pesticides also may be contributing as a significant source of pollution.

The Cauvery river in Mysore and Mandya region passes through several religious places where rituals and bathing is done in water source which is also contributing largely as source of pollution especially at the sampling station of Srirangapatna as it's a holy and pilgrimage place.

The total coliform is found to be high due to illegal sewage water entering the surface water body and in sampling stations where settlements are near the river, there is a possibility of open defecations which has to be prevented.

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