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*Research article*

# STUDIES ON THE MICORBIOLOGY OF KALLADA RIVER IN KOLLAM DISTRICT (KERALA STATE)

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**ABSTRACT:** Kallada River originates from the Kuluthupuzha ranges of Western Ghats, flows towards the west and ultimately drains in to the Ashtamudi lake in Kollam District. The government of Kerala established a project known as Kallada Irrigation Project by constructing a dam at Parappar in Thenmala across the river to form a reservoir. It has canals and subcanals also.the main purpose of the project is for irrigation and agriculture. The present study was aimed to assess the microbiological quality of Kallada river water. Standard procedures were adopted for the study. The parameter studied were total Plate count, total number of Coliforms, Total number of *E.coli* and total number of faecal streptococci. The study showed that the river water is unfit for drinking or house hold purposes. Ashtamudi Lake is more contaminated with pathogenic bacteria probably due to intense anthropogenic activities and can cause incidence of waterborne disease if used improperly. Hence preventive measures are to be adopted and awareness programmes are to be organized by governmental and nongovernmental organisations. A number of recommendations are suggested for the above purpose.

**Key words:** Kallada Irrigation Project,

## INTRODUCTION

India is rich in water resources, being endowed with a network of rivers and blessed with snow cover in the Himalayan range that can meet a variety of water re-quirements of the country. However, with the rapid increase in the population of the country and the need to meet the increasing demands of irrigation, human and industrial consumption, the available water resources in many parts of the country are getting de-pleted and the water quality has deteriorated. [1] Kerala is a blessed with 44 rivers and is a big resource for the people for various uses.Almost all river water is used for irrigation purposes in Kerala. One of the important rivers in Kerala is Kallada River and is mainly used for irrigational purpose in the Kollam District and the project is termed as Kallada Irrigation Project (KIP). Kallada river is a west flowing river which originate from Kulathupuzha, Shenthuruni ranges of western ghats. The project area lies between $8^{o}$ 49'N and $9^{o}$ 17'N aat longitude $77^{o}$ 16'E and $76^{o}$ 24' E. Kallada river basin is bounded by Achenkovil basin on the north and Ithikkara basin on the south. The tributes of Kallada river are Kalthuruthi river, Shenthuruni river and Kulathupuzha river. These river joints at Parappar where the reservoir isconstructed. Kallada river passes through the following Taluks, Nedumangad, Pathanapuram, Kottarakkara, Kunnathur and Quilon and it ends at Ashtamudi lake. The length of Kallada river is about 130km. Kollam district is endowed with perennial supply of water. In order to augment the irrigation potential, several plans were evolved during 1953 to undertake river basin schemes. Kallada Irrigation Project, the biggest multipurpose project, undertaken by the State Government, is intended to utilise the water of Kallada river, mainly for irrigation purpose in Kollam, Pathanamthitta and Alappuzha districts. There is also a proposal to generate 50 M.W. of electricity from the dam at Thenmala.

The Kallada project comprises of a masonry dam of 335 m. in length with a maximum height of 81 m. at Parappur in Thenmala across the river to form a reservoir, a pick up weir and sluices at Ottakkal. The 69 kms. right bank canal and the 57.75 kms. left bank canal take off from the pickup weir. It is estimated that the two canals together will serve an area of 68,000 hectares.

The projects are aided by the World Bank. Perumkulam yelah in Kollam taluk, West Kallada Scheme in Kunnathur Taluk, reclamation of Polachiral lake in Kollam Taluk and Ithikkara yelah schemes, are the medium irrigation schemes in the district. The quality of water is changed due to various reasons. In congested areas the water supplies get polluted mainly by domestic and industrial wastes. Sewages containing human excreta is the most dangerous material polluting water. Population growth, rapid industrial and technological developments, urbanisation, periodic droughts and even legal decisions are some of the reasons for the declining of water quality. The present study was to check primary the microbiological quality of water of Kallada river and to assess whether the water is suitable for house hold and drinking purposes. [2, 3, 4].


**Figure-1 Map showing the various taluks in Kollam district through which kallada river flows.**

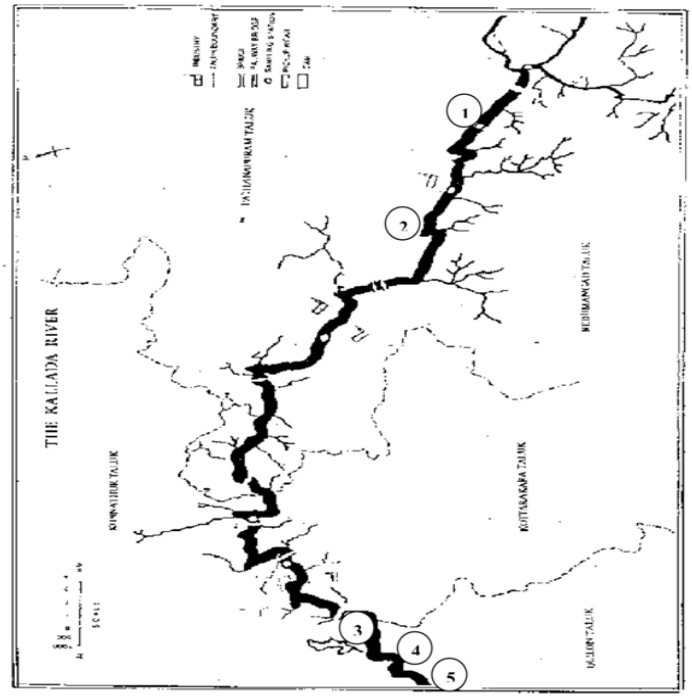


**Figure 2 – Map showing the five stations from where the water samples were collected for the study in Kallada river**

## MATERIALS AND METHODS

The present investigation was carried out by analysing the water samples at five different stations (Station I - V) of Kallada River in Kollam District (Figure 1 and 2). The water samples were analysed as per Indian Standards IS: 1622 - 1981. [5] Polyethylene made plastic bottles of clean sterilized, narrow mouthed neutral bottles were used for sampling. The samples were collected early in the morning and brought to the laboratory within 6 hours, which was kept in ice chest. The water was studied microbiologically using the following parameters.

Total plate count (TPC), Total coliforms (TC), Total number of *E.coli*, Total number of Faecal streptococci (FS)

## RESULTS

The result of the microbiological investigation on the Kallada river at various stations study as follows:

### TOTAL PLATE COUNT

The total plate count ranged from 1400 to 3400. The following are the values recorded; 3400, 2300, 1500, 1600, 1400 at Thenmala, Punalur, Kadapuzha, Arinallur, Koivila respectively. The highest count is founded at Thenmala - 3400 cfu and the least count was at Koivila - 1400 cfu. The average count was about 2040 cfu. (Table 1)

### TOTAL NUMBER OF COLIFORMS

The maximum count was 24000 and the lowest count was 220. The counts in the various station was recorded as 220, 2200, 24000, 17000, 22000 at Thenmala, Punalur, Kadapuzha, Arinallur, Koivila respectively. The maximum count was noticed at station III- 24000 (Kadapuzha) and the lowest count was at Station I -220 (Thenmala). The average count was about 13084. (Table 1)

### TOTAL NUMBER OF *E.COLI*

The highest count was 11,000 and the lowest count was 4. The values obtained at various station was as follows : Thenmala - 4; Punalur -17; Kadapuzha - 5000; Arinallur - 11000 and Koivila - 9000. The highest value was noticed in station IV - Arinallur (11000) and lowest at Station I - Thenmala (4). The average count was found to be 5004. (Table 1)

### TOTAL NUMBER OF FAECAL STREPTOCOCCI

The maximum count of faecal streptococci was 1700 whereas the lowest count was 130. The count at Thenmala ( Station I) was 130; In Punalur (Station II) the count was 800; in Kadapuzha ( Station III ) the count was 500 and in Arinallur ( Station IV )and in Koivila.( Station V ) the count was 1700, of this, the lowest count was recorded at Station I Thenmala (130) and highest was observed at Station IV and Station V(Arinallur and Koivila) where the count was derived to be 1700. Average count was about 966. (Table1).

**Table- 1 Data showing various microbial counts of water samples obtained from different stations of Kallada river, in Kollam District**

| Stations | Total plate count per ml of water (cfu) | Total coliforms per 100ml of water | Total *E.coli* per 100ml of water | Faecal streptococci per 100ml of water |
|---|---|---|---|---|
| Station I | 3400 | 220 | 4 | 130 |
| Station II | 2300 | 2200 | 17 | 800 |
| Station III | 1500 | 24000 | 5000 | 500 |
| Station IV | 1600 | 17000 | 11000 | 1700 |
| Station V | 1400 | 22000 | 9000 | 1700 |

## DISCUSSION

The Kallada river originating in Kulathupuzha, Shenthuruni ranges of the western Ghats of Kerala State [$80^0$ 49'N and $90^0$ 17'N at longitude $77^0$ 16'E and $76^0$ 24'E) traverses a distance of about 130Km to finally open into the Ahstamudi lake in Kollam. Considering its irrigational potential, the Kerala Government started the Kallada Irrigation Project (KIP) for its need in Kollam, Pathanamthitta and Alapuzha Districts. The results of the microbiological studies at different stations at Thenmala, Punulur, Kadapuzha, Arinalloor and Koivila showed variations.

The result indicated that the stations near the Ashtamudi lake where the river opens is more contaminated with pathogenic bacteria than the upper stations of Thenmala and Punalur. This was evidence by the standard microbiological procedures adopted for the detection of Total plate count, Total no. of Coliforms, Total no: of *E.coli* and Total no. of Faecal streptococci.This higher no of bacetrial count near the Ashtamudi lake station might due to the intense anthropogenic activities here. As a whole the no. of counts of various microbiological parameters indicate that Kallada river water is polluted as per the standard values of Bureau of Indian Standards or European Union Standards. But Kallada river water is primarily used for irrigational purposes than for drinking purpose. According to BIS for irrigational prupose, the present result is not alarming, since bacteria will not affect the plant growth or its productivity. But if this river water is used for drinking purpose or household purpose etc. extreme care should be adopted by local people. It is to be noted that in summer when there is scarcity of water, people may have a tendency to utilize this water resource. As a result, consumption of bacterial contaminated water from river especially in the low lying areas surounding Ashtamudi lake may contribute to greater incidence of diseases especially gastro-intestinal disorder. The most common diseases that may appear are diarrhoea dysentery, typhoid worm infection, infectious hepatitis (jaundice). This could be a dangerous situation especially during rainy seasons. It may be noted that there is relatively little microbiological pollution in places like Thenmala and Punalur. The present investigation reveals that Kallada river is polluted physically and chemically as well as contaminated by pathogenic organisms thus making it unfit for direct drinking purpose or household purposes. Hence, there is a need for awareness programmes among the local people by governmental organisations or non-governmental organisations.

## RECOMMENDATIONS

In view of this the following recommendations are suggested for safe use of river water and for prevention of pollution of Kallada river.

1. For safe drink, cultivate the habit of drinking boiled water.

2. Sewage treatment systems control the sewage pollution to a certain extent. It was done by installing treatment plants such as trickling fiters, activated sludge and oxidation ponds.

3. Chemical treatment of industrial effluents by hydrolysis, electrolysis, ionization, ozonisation, chlorinations, reverse osmosis etc. The treated effluents may be dumped in deep tanks or discharged into outer sea.

4. Domestic sewage tanks - domestic sewage can be released into a specially constructed septic tank. The sludge formed must be removed periodically.

5. Recycling of waste is an effective and ecofriendly way of disposing wastes. This involves extraction of useful substances from garbage and sewage.

6. Creating environmental awareness among the people regarding the importance of keeping precious water clean.

7. Enforcement of laws to ensure the proper disposal of wastes from factories, industries, shops and even the houses, the problem of water pollution can be controlled to some extent. The water (Prevention and Control of Pollution) Act, 1974, with its amendments is a comprehensive legislation enacted for this purpose.

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