

Investigation on Surface Water Quality by Microbial Identification

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ABSTRACT

One of the Indian subcontinent's river systems is the Cauvery. It flows for about 800 kilometres west to east before reaching the Bay of Bengal, beginning in the largest of the Western Ghats. Because of its cultural significance and the large population living on its bank, it necessitates numerous forced and voluntary human activities. The current groundwater quality in this Tamilnadu river system has been thoroughly investigated. Samples were taken from four different locations along the Cauvery River. Microbiological research was carried out during the winter. Bacterial analysis requires calculated parameters: total viable count (TVC), total coliform count (TC), total streptococcal count (TS) and six distinct pathogenic bacterial forms. It is concluded from the analysis that the total coliforms (TC) for most sites were 10^3 ml^{-1} in magnitude. Greater than appropriate sum has been discovered in urban areas. The objectives of this research was to determine current indication levels as well as several human microbial pathogens and their seasonal variations at several Cauvery River locations. As previously mentioned, the Cauvery river system has been severely impacted by atmospheric deposition, largely due to urban sewage and industrial confluences. After this investigation, a huge microbial gene pool was collected, which was reflective of the increasing variety of bacteria in the sector.

Keywords – River Water, Microbial Testing, Identifying physical and chemical Characterisation, Diseases caused, solution and Prevention

1. INTRODUCTION

Rivers play a significant role as a major water supply for our world. Unfortunately, the river is tainted by indeterminate waste processing, a number of natural processes and toxic pollution, impacting its physio-chemical properties and microbial efficiency[1]. The support system of the majority of the population is considered sacred in towns, cities, and villages[2]. In the past years, human population expenditure, industrial development, intensive farming activities and the drainage of large quantities of waste water into the river have contributed to water quality degradation. Anthropogenic sources have had such an impact that water sources have largely lost their ability to purify themselves. Water has long been a central player in the propagation of human diseases and as a microbe predictor. Because human faecal matter is more likely to cause entire bacterial diseases, the most important criterion for water quality is that it is free of faecal matter pollution[3]. Coliforms are the most common biological indicator used to assess water quality. Bacterial spores, which can be found in the waste of warm-blooded animals, including humans, are a common component of their intestinal tract microbiology[4]. The two frequently used microbiological processes for determining the quality of groundwater and water systems are Total Coliform (TC) and Faecal Coliform (FC) counts.

It is possible to measure pathogen levels in the water by calculating the concentration of the pathogen indicator organism. Organisms with pathogenic indicators, also called indicator organisms (EPA, 2001). As a diffuse emission measure, indicator species are also used. To determine the variability of water quality, Maul and Cooper (2000) looked at the concentrations of enterococci and faecal coliform bacteria. The possible risk of faecal pollution due to diffuse runoff in water resources and marine aquatic waters was studied by Aitken (2003) using indicator species[5]. Indicator species are also used to classify the origins of pollutants as a tool. Bacteria as water characteristics are often utilized in 2 ways: 1st, their presence is frequently used as a sign of unclean pollution, and thus as a signal to determine why such contamination occurs, regardless of its severity, and what measures are frequently taken to eradicate it; second, their presence is widely used as an illustration of the potential health hazards that unclean pollution causes and eventually, their look are often taken as associate degree illustration of the doable risk of health risk that unclean pollution poses contamination possess[1]. The possibilities of waterborne infections would be the upper degree of indicator microorganism, the upper level of unclean pollution[6]. Completely different teams have researched the microbiological contribution of assorted stream systems and a number of other queries have recently been raised concerning pathogens arising from downfall runoff[6]. Protection of stream contamination wants careful management of bio and microbiological parameters. Thus, identification and a quantification of indicator species area unit of primary importance for the management of sanitation facilities and microorganism water quality[7].

Microorganisms that cause unwellness and cause a major threat to public health are called pathogens (Balbus et al., 2004). Enteric viruses originating from excretion, moribund microorganism like *E. Coli* O157:H7, and protozoan pathogens like *Cryptosporidium* and flagellate protozoan are all thought of representative of these related to waterborne unwellness (Ferguson et al., 2003). In pollution studies, medical specialty analysis of water is especially necessary as a result of it provides an immediate live of pollution's adverse effects on human health[8]. The aim of this study was to imagine and use the Cauvery stream system's culturable microorganism diversity to assess pollution levels. As a result, this study was conducted so as to develop a microbic contamination index that will offer an entire image of all aspects of pollution in Tamilnadu's Cauvery stream system[9].

2. MATERIALS AND METHODS

Study Area

The Cauvery River is one of the major peninsular rivers in South India. Its catchment area is in the southern part of the Indian subcontinent, between latitudes 10°7'N' -13°28'N' and longitudes 75°28'E - 79°52'E[10].



The major tributaries of the stream embrace the Hemavathi, Lakshmanthirta, Kabini, Shimsa, Bhavani, and Amaravathi. The basin encompasses a continental climate, with AN annual precipitation forecast of 1092 millimetre and a mean elevation of concerning 640 m[10]. The basin's immense transportation network and a mess of agricultural activities have sparked the expansion of nearly sixty cities. It's a number of the older irrigation dams (locally called anaicuts) from historical times, as a results of that some tributaries disappear into the paddy fields of the substance space, going solely the most tributaries to hitch the Bay of geographical region. As a result, the Cauvery stream is extraordinarily prone to each natural and semisynthetic changes (Ramanathan et al., 1994).

3. Weather Condition

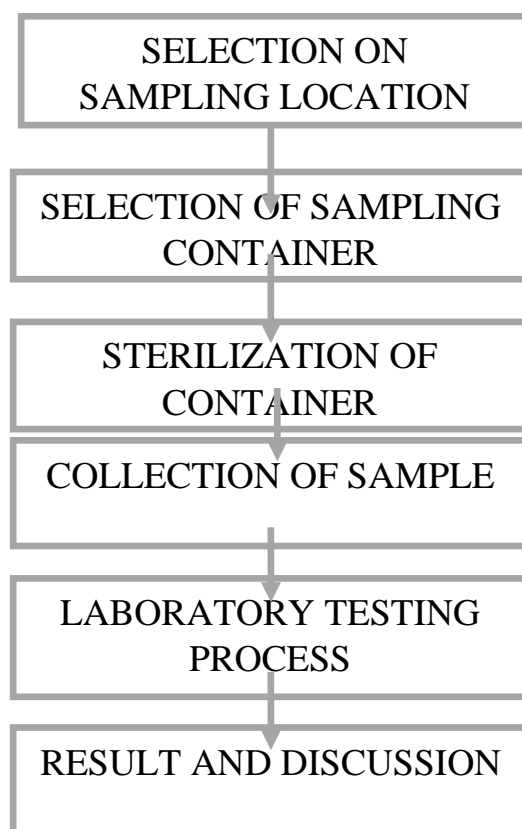
June to August is the South-West monsoon season, and September to December is the North-East monsoon season. After a brief Winter (January-February), the post-monsoon season transitions into Summer, which is marked by hot, humid weather. We had obtained a water sample during the winter season due to a lack of time (January 2019)[4].

4. Sampling Sites and Sampling Method

The Cauvery River System in Tamil Nadu was thoroughly surveyed in order to identify various sampling locations. Water samples were taken from four different sampling locations on the Cauvery River's runoff between the monsoon (rainy) and winter seasons during the Gregorian calendar month of 2019[11]. The stream drains/receives massive amounts of land product, urban and rural waste material effluent, agricultural and industrial wastes throughout the year. The sampling took place over the course of the winter season (January 2019). Mayanur (S1), Mohanur (S2), Noyyal (S3), and Pallipalayam area unit the sampling locations (S4) each position provided one metric capacity unit of water, that was keep in pre-sterilized bottles[12]. All samples were collected with the necessary precautions for microbiological analysis, stored on ice in a refrigerator, and transported to the laboratory for microbiological analysis.

All of the media were ready with double H₂O and properly autoclaved. 5 days before sampling, the plates were set. Unfold plating on culture medium and acknowledges a particular plates with zero.2 millilitre of applicable dilutions was wont to estimate the microorganism population in several samples. Each media plates were incubated at 37°C for a minimum of twenty four to forty eight hours before final colony counts were taken[13]. Each of the experiments were administered in triplicate. Once terribly high counts of any specific cluster of microorganism were found in any medium once twenty four hours of incubation, water samples were diluted ten or a hundred times and re-examined exploitation the unfold plating technique as delineate on top of. During this study, to scale back the uncertainties related to reckoning the moribific microorganism as like organisms for example Escherichia like organisms (ECLO), eubacteria Faecalis like organisms (SFLO), enterics like organisms (SALO) area unit counted to assess the water quality. Organic chemistry and morphological experiments were wont to classify completely different species from multiple retailers. We have a tendency to discovered that basically eightieth of ECLO, SFLO, SALO, SHLO severally[14]. Using the media manufacturer's guide and knowledge from previous studies, the quality sleuthing and locating characteristics of various microbic species were identified, as well as the initial enumeration of contamination indicator and moribific microorganism[15].

5. METHODOLOGY



6. MICROBIAL PARAMETERS AND DESCRIPTION:

1. Escherichia Coli
2. Coliform Bacteria
3. Salmonella
4. Shigella
5. ShigellaSp
6. Faecalis Streptococci
7. Pseudomonas Aeruginos

The microbial species mentioned above are used to determine the consistency of river water samples. These bacteria are widely found in water and can cause a number of serious illnesses in people who drink it. As a consequence, in our project, we chose the above microorganism identification.

7. RESULTS

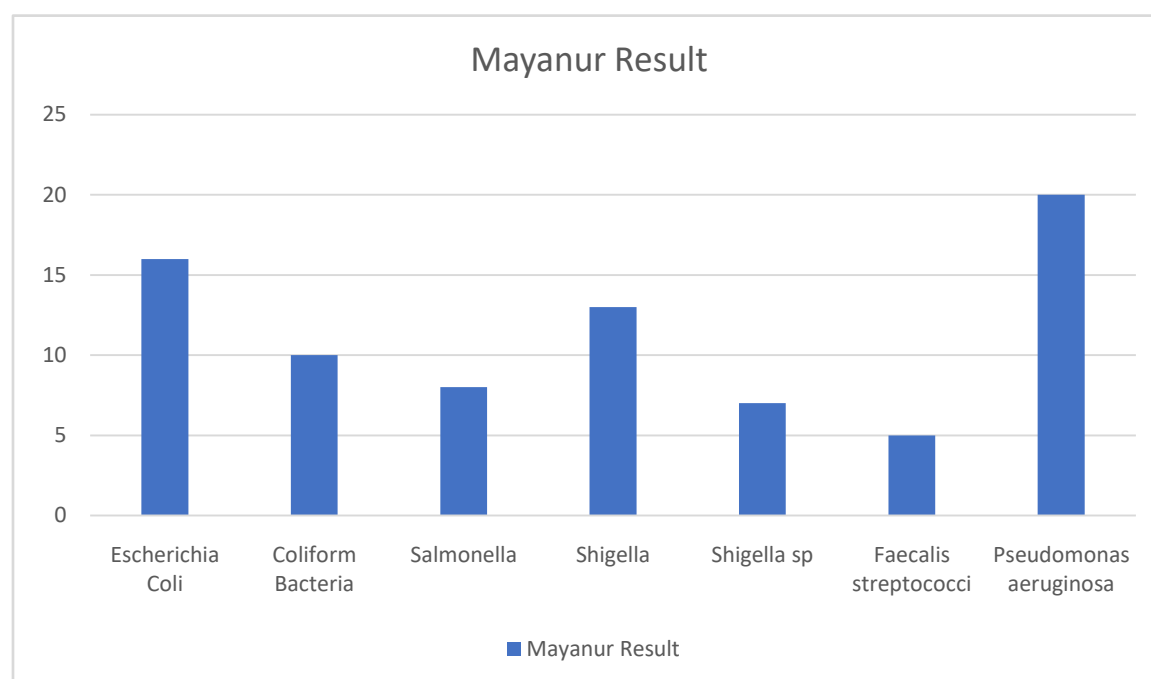
Climatic practises have had such a robust impact on water sources that they need lost abundant of their ability to purify themselves. For this analysis, the sampling space was terribly wide. The info assortment was comprehensive since we have a tendency to sampled four sites throughout the winter season (January 2019). Regardless of the fact that our sampling locations were chosen to reflect the area's pollution gradient, our findings are useful in understanding seasonal variations in pollution indicators and a variety of human infective microorganism. These findings were frequently used to argue that the Cauvery River was

unfit for human consumption. The whole Viable Counts (TVC) for all sites all told winter seasons were within the order of magnitude of above 10^4 ml⁻¹, that was very high. TVC levels all told samples were found to be above those suggested by the Bureau of Indian Standards (ISI, 1991).

UNIT: CFU/ml

SAMPLE 1: Mayanur

S.NO	Test Parameters	Result
1	Aerobic Microbial Count	24 hours-220 72 hours -940
2	Escherichia Coli	16
3	Coliform Bacteria	10
4	Salmonella	8
5	Faecalis streptococci	5
6	Pseudomonas aeruginosa	20

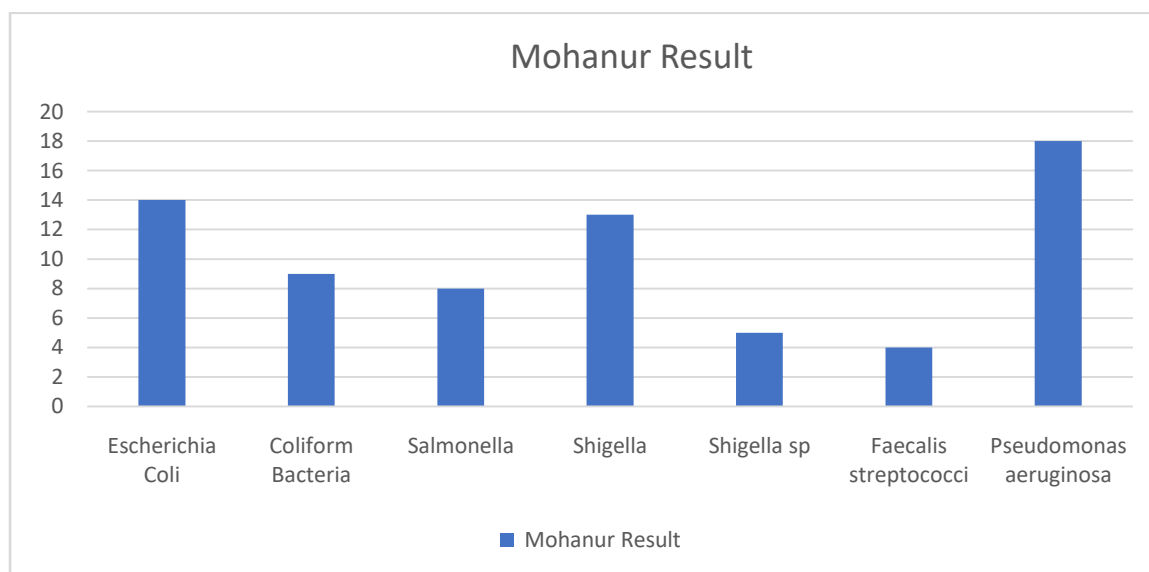


Mayanur is part of the Karur district. A barrage has been built across the river, which serves as a picnic area for the locals. A greater number of people live near the river's edge, and they use the river's water for their daily activities. These practises have a direct effect on water quality and quickly increase the microbial count.

SAMPLE 2: Mohanur

S.NO	Test Parameters	Result
1	Aerobic Microbial Count	24 hours-215 72 hours -920
2	Escherichia Coli	14
3	Coliform Bacteria	9
4	Salmonella	8

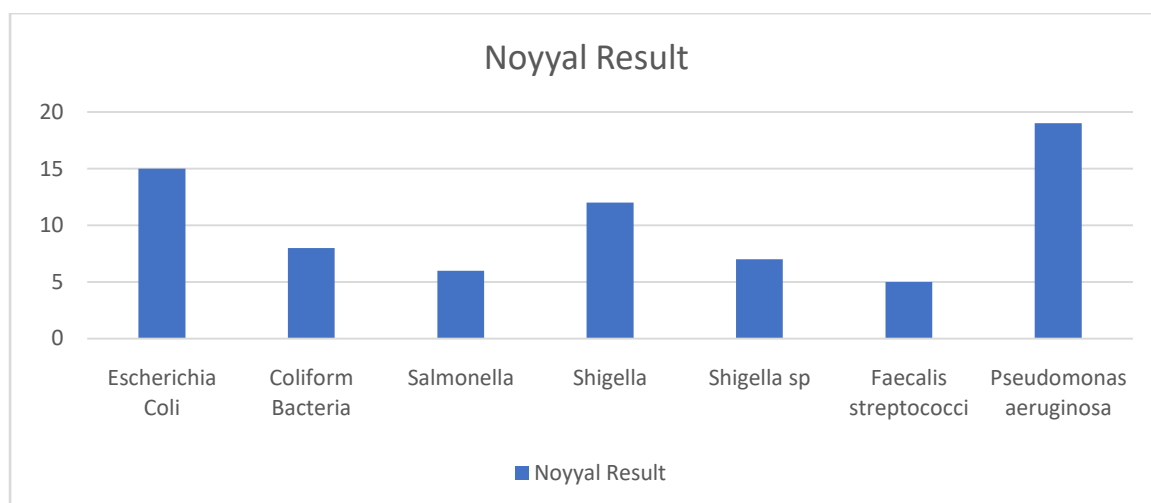
5	Faecalis streptococci	4
6	Pseudomonas aeruginosa	18



Namakkal district includes the area Mohanur. This area has a higher population density along the river basin. They use river water for their everyday operations, but they have also begun to dump untreated waste in the river. In addition, small-scale factories have been dumping their effluent waste into rivers. As a result, these actions have a significant impact on the river's water quality. The microbial count in the area has rapidly increased as a result of these disposal activities.

SAMPLE 3: Noyyal

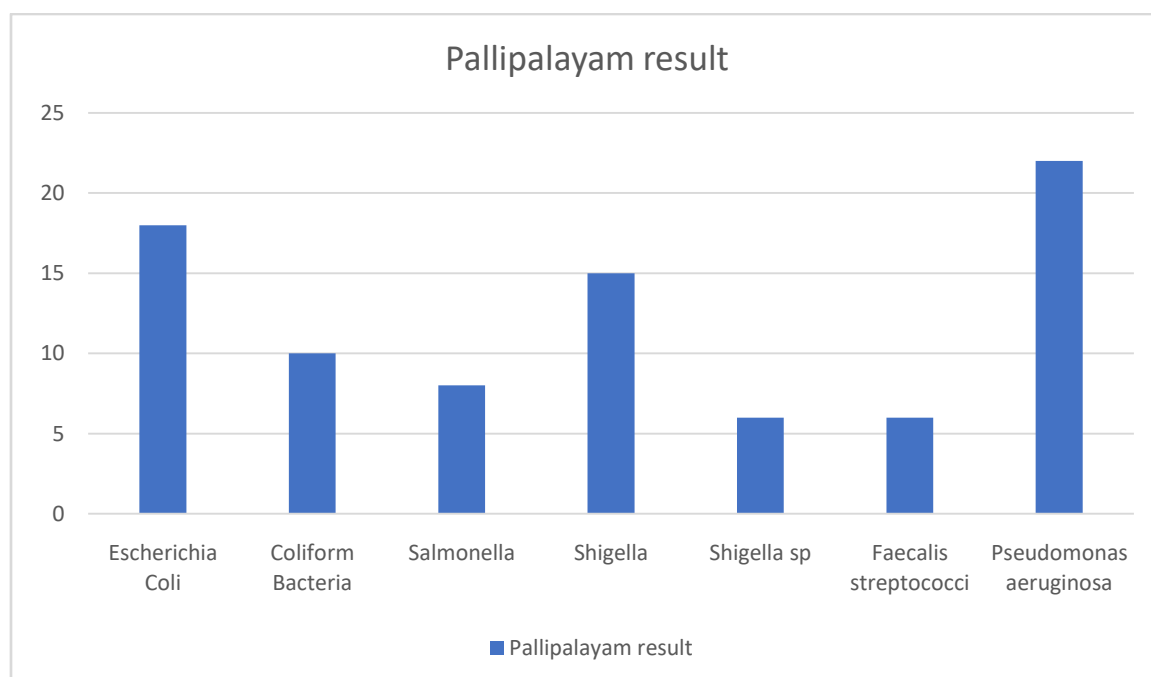
S.NO	Test Parameters	Result
1	Aerobic Microbial Count	24 hours-210 72 hours -890
2	Escherichia Coli	15
3	Coliform Bacteria	8
4	Salmonella	6
5	Faecalis streptococci	5
6	Pseudomonas aeruginosa	19



Karur district covers the area Noyyal. It is in this location that the smaller tributaries of the Cauvery River mix. The majority of Erode's and Tiruppur's industries discharge their effluent waste into these waterways. It has an effect on the water's consistency and inhibits the water's ability to self-purify. Microorganisms multiply as a consequence of these practises.

SAMPLE 4: Pallipalayam

S.NO	Test Parameters	Result
1	Aerobic Microbial Count	24 hours-220 72 hours -940
2	Escherichia Coli	18
3	Coliform Bacteria	10
4	Salmonella	8
5	Faecalis streptococci	6
6	Pseudomonas aeruginosa	22



Pallipalayam is located in the Namakkal district. A larger number of people have settled along the river's edge, and several factories are located nearby. As a result of these practises, sewage and effluent waste are released into the river basin. The number of microorganisms has recently risen as a result of these disposal activities.

8. CONCLUSION

The aim of this analysis is too raised perceive the infective agent indicator organisms' concentration dynamics within the Cauvery geographic area, likewise because the effects of purpose and non-point contamination on the water quality of microbic options. The dominance of the on top of unhealthful microorganism genera in Tamilnadu's Cauvery geographic area indicates that they may be used as indicators. Overall, a microbiological study of stream water within the Cauvery geographic area showed that it absolutely was contaminated by untreated waste, feculent contaminants, and industrial waste, creating it unfit for drinking and different recreational functions. As a result, watching microbic pollution on an everyday basis ought to be Associate in Nursing integral a part of this area's defence strategy. As a result, the stream required in depth impounding. Effective steps is also taken to forestall wellness transmission through water and to avoid wasting the water body from deterioration.

9. References

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