

Studies on the Microbiology of Vattakkayal, a part of Ashtamudi Lake, South India

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Abstract

Vattakkayal, a part of Ashtamudi lake in Kollam district in South India is the study area. Vattakkayal is located at 8°55'3" North latitude and 76°32'57" East longitude. A systematic seasonal collection of surface water for microbiological study was made from the five stations of Vattakkayal lake. The water samples were subjected to coliform count tests by Multiple Tube Fermentation Method. The results indicated that in all the seasons, most of the stations of Vattakkayal were contaminated with pathogenic bacteria. The present investigation is the pioneer one for collecting the detailed information on microbiological aspects of Vattakkayal, a part of Ashtamudi Lake. If this lake is not protected from these hazardous pollutants, the lake as well as the dependent organisms will get badly contaminated.

Key words: Microbiology, Vattakkayal, Coli form.

I. INTRODUCTION

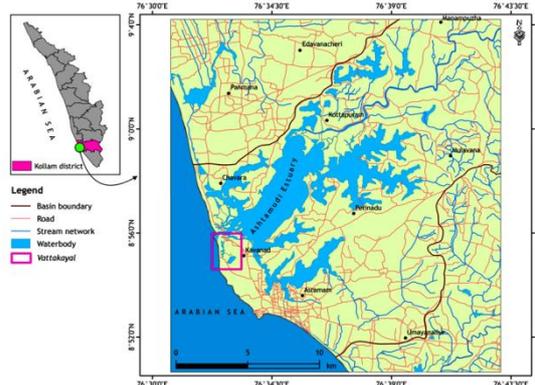
The water quality of Ashtamudi Lake is dwindling specifically in the reach joining the site with built up area of Kollam city, TS Canal and Kallada River. It presently receives all untreated sewage from the Kollam city, direct disposal of human excreta from hanging latrines and household waste. The microbial contamination is high in some locations particularly around the port area and in the Kallada River zone (Perumpe, Asramom, Vincent Thuruthu). The Southern portion of Ashtamudi Lake, Ramsar site is affected by disposal of wastes from the Coconut husk retting, Paper and palm oil industries, Tourism activity, Ceramic, Cashew factories and hospitals which resulted in the increases of bioaccumulation of sediments and heavy metals. The untreated effluents from small-scale industries, food processing units, unscientific methods of fishing, boat building yards, oil spillage and slaughterhouses makes the situation even worse [1]. The major objective of the present work is to investigate the bacteriological parameters in Vattakkayal, a part of Ashtamudi Lake in South India.

II. MATERIALS AND METHODS

A. Study area - A General Profile

Vattakkayal, a part of Ashtamudi lake in Kollam district in South India is the study area. Vattakkayal is located at 8°55'3" North latitude and 76°32'57" East longitude, and is about 9 kms away from Kollam Railway Station and located in the Sakthikulangara Panchayat. The location map of the study area is given in Fig. 1.

Vattakkayal occupies more or less a central position of Kollam with respect to Neendakkara, Kavanadu and Maruthady area. The Vattakkayal occupies an area of about 37 acres. The existing land use of the area consists of water bodies surrounded by marshy vacant land. Previously this low lying vacant land was used for paddy cultivation and the water body is enriched with fish and aquatic life in abundance. At present this kayal is with weeds like water hyacinth as the water body receives domestic wastes, domestic drainages, wastes from nearby factories, etc. The Vattakkayal also indirectly receives waste water discharged from neighboring fish processing unit, ice plants and freezing plants.



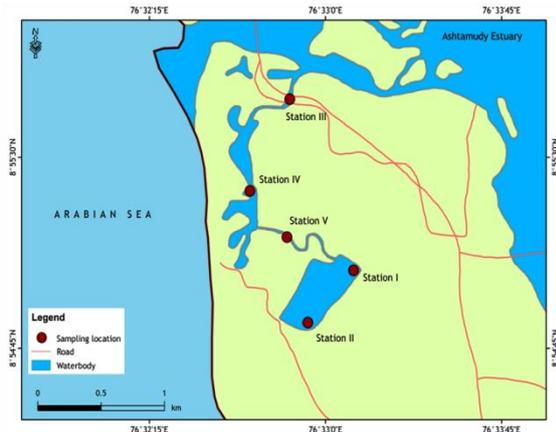


Fig. 1 Location Map of Study Area with Sampling Stations

B. Bacteriological Analysis of Water

The collected samples were transported to the laboratory as early as possible, in controlled conditions to avoid microbial contamination. Then samples were stored in refrigerator at 4⁰ C to prevent fluctuations in bacterial count before analysis [2]. The water samples were subjected to coliform count tests by Multiple Tube Fermentation Method [3] for analyzing the *Total Coliforms*, *Fecal Coliforms* and *E. coli* count in the water samples collected from Vattakkayal, a part of Ashtamudi lake. MPN index of total coli forms per 100 ml is calculated by referring the MPN table.

III. RESULTS

The results of the seasonal variations of Total coliforms (TC), Faecal coliforms (FC) and *Escherichia coli* (*E.coli*) of the water sample collected from Vattakkayal are shown in Fig. 2. Total coliforms are a large collection of different kinds of bacteria which is an indicator of water pollution. The samples collected in pre monsoon and monsoon showed high level of Total coliforms. During pre monsoon and monsoon, all the samples except from station 2 showed 1600 (MPN/100 ml) and during post monsoon season the values were slightly reduced 1100 (MPN/100 ml). In station 2 total coliforms were absent in pre monsoon but high values were confirmed in monsoon 1600 (MPN/100 ml) and post monsoon 1100 (MPN/100 ml) seasons.

Faecal coliform bacteria are that originate from intestinal tract of homeothermic animals and their presence indicate fecal contamination. In all the seasons (pre monsoon, monsoon and post monsoon), all the samples showed 1600 (MPN/100 ml) except station 2 in pre monsoon season. In station 2 Faecal coliforms were absent in pre monsoon season.

Analysis showed that high values of *E. coli*, pathogenic bacteria was noted in pre monsoon and monsoon seasons 1600 (MPN/100 ml) except at station 1 and 2. In station 1 and 2 absence of *E. coli* was noticed in monsoon and pre monsoon

respectively. During post monsoon season the values were slightly reduced 1100 (MPN/100 ml) in all stations except station 1 and 2. In station 1 (25 MPN/100 ml) and in station 2, *E. coli* was absent. The results indicated that in all the seasons, most of the stations of Vattakkayal were contaminated with pathogenic bacteria.

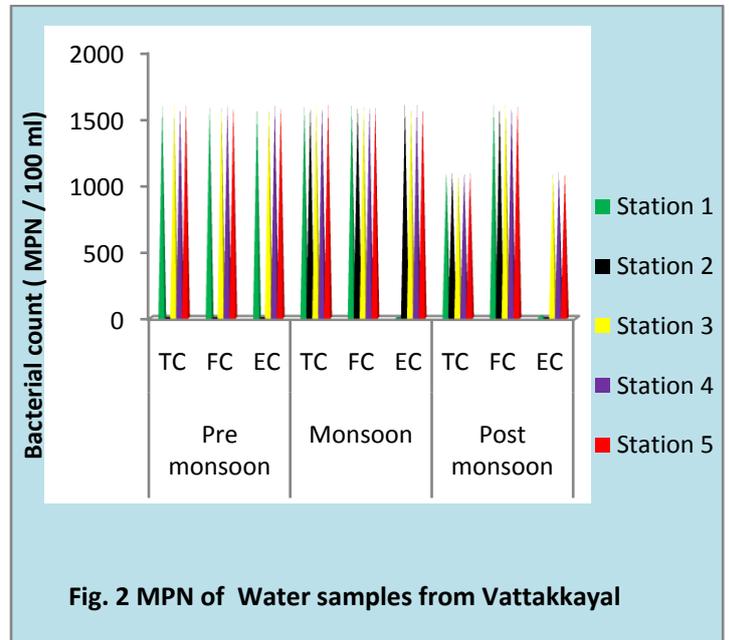


Fig. 2 MPN of Water samples from Vattakkayal

IV. DISCUSSION

Vattakkayal lake, a part of Ashtamudi lake is a brackish water lake of Kerala. This lake is a rain fed one depending on seasonal rains for its yearly replenishment. Abundance and diversity of biotic communities are influenced by a mixture of physicochemical parameters of the environment. Biological and physico-chemical methods are complementary, as they provide different sorts of information, both are needed for a full assessment of an ecosystem. The physico-chemical parameters are interdependent and they vary with seasons. Being in the tropical climatic region, the diurnal and seasonal fluctuations in atmospheric temperature significantly affect the water temperature of the lake. This temperature fluctuation directly affects the surface water temperature and the lake as a whole [4].

The present study revealed the occurrence of *Total coliforms*, *Faecal coliforms* and *E.coli* in the Ashtamudi Lake which suggests the presence of pathogenic bacteria genera in the water body. The present investigation reveals that all part of Vattakkayal water was polluted by sewage, fecal contaminants and industrial wastes and the water of Vattakkayal is not suitable for direct household purposes. Regular monitoring of microbial contamination in the water of Vattakkayal and prevention of pollution should be essential

components for the protection strategy of the human health. Hence, there is a need for awareness programs among the local people by governmental organizations or non-governmental organization.

V. CONCLUSION

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REFERENCE

- [1] Balakrishnan and Nair, N Ecology of Indian estuaries VII "Inorganic nutrients in the Ashtamudi estuary" Dept. Aquatic Biology Univ. of Kerala, Trivandrum, Mahasagar,17(1),19-32., India1989.
- [2] Senior, B .W. (1996). *Examination of water milk food and air. In: practical medical Microbiology 14th edn.* Mackie and mc Cartney (eds.), 883-887.
- [3] WHO. (1997). *Guidelines for Drinking Water Quality. Surveillance and control of community supplies.* Geneva. 51-57.
- [4] Sasidharan C. K. and P. Sivanandan, Focus on Resource Management Issues for Eco tourism Development – A Case Study of Ashtamudi Estuary, Taal 2007, 12th World Lake Conference, 2007