



Research Paper

WATER QUALITY AND ASSOCIATED FUNGAL ISOLATES IN UPPER REACHES OF THAMIRAPARANI RIVER (WEST) DURING LATE WINTER

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Abstract

Water samples were collected from three sites of the Thamiraparani river of the Kanyakumari District from Kothaiyar (8°31'11.75"N 77°18'36.75"E 930), Kuttiyar (8°30'03.27"N 77°18'11.59"E 347) and Mothiramalai (8°29'55.28"N 77°17'56.56"E 433) in the month of Feb.2013. These water samples were analysed using standard procedures and different chemical parameters and were examined for fungi by plating method culturing in Rose Bengal agar and Potato Dextrose agar medium. In the three sites two of fungi viz., *Aspergillus sp* and *Chaetomium sp* were found. Thus the river water requires to be treated from contamination before the use for public. The absence of phosphates in the water sample also needs attention in terms of water quality management.

Key words: Thamiraparani river (west), parameters, aquatic fungi, pollution.

INTRODUCTION

The essential component for the survival of the world is water. Unfortunately, good and safe drinking water is becoming a rare commodity. Out of the water bodies, river serves a significant role because of water supply for domestic, industrial, agricultural and power generation. Considerably the river water is also disposed of sewage and industrial waste and put under tremendous pressure due to human activities. In the last few decades, the deterioration of the quality of Indian rivers has been increasing. Rivers have been unmindfully used of the disposal of domestic and industrial effluents far beyond their assimilative capacities and have been rendered grossly polluted [1].

Striking data estimate, about 80% of the total population in India is deprived of pure and safe drinking water. Moreover, a recent study reports that the villages in India, which had infected water supply with 90% of total drinking water is severely polluted [2]. Of the Indian rivers, Ganga is the most polluted river in the world [3]. In addition to this, river Damodhar, Hooghly, Kulu have almost the same story to reveal. Among the South Indian rivers, "Thamiraparani" river serves as the principal source of water for drinking and agricultural purposes. Industrial pollutions over the water quality of the river has made concern to be strongly felt. Within the district of Kanyakumari, the river Thamiraparani west originates from the Mahenthagiri hills of the Western Ghats with an elevation of 1,645.2 metres and passes by the Kothaiyar dam. It shares through a 60 km length and confluences with the Arabian Sea at the Thengapatnam estuary (7°53' N and 70°07'E).

Due to unplanned urban development, deforestation, large scale sand mining, mushrooming brick kilns, coir retting as well as automobile, domestic and industrial waste the river water is now gradually undergoing eco-degradation [4]. The rubber sediments dissolved within the river water segments by the rubber growing workers is a threat to the domestic use of human being. With this view in mind, the present work is planned to study the seasonal variation of water quality and associated fungi with upper reaches of Thamirabarani river (west).

MATERIALS AND METHODS

Three different stations from the Thamirabarani river of kanyakumari were selected for both water quality parameters and fungal diversity analysis. Station -1: Kothaiyar (8°31'11.75"N 77°18'36.75"E 930), Station - 2: Kuttaiyar (8°30'03.27"N 77°18'11.59"E 347), Station - 3: Mothitramalai (8°29'55.28"N 77°17'56.56"E 433).

Water quality parameters were analysed in the water samples that are collected from three different sites in the month of February 2013. Water sample was collected in polythene bottles for 2 litres and carried to the laboratory, where physio-chemical parameters were analysed as per standard methods [5]. The parameters selected for analysis were pH, conductivity, Turbidity, TDS, TSS, Total Hardness, Calcium as CaCO₃, Chloride, Sulphate, Ammonium, Phosphate, Iron, Fluoride, BOD, COD, Methyl Orange, Alkalinity, and Nitrate.

Water samples from three sites for fungal diversity analysis were collected in sterile plastic bottles and brought to the laboratory. Isolation of fungi was carried out by serial dilution method [6]. Cultures were maintained on potato Dextrose agar (PDA) and Rose Bengal agar medium. By using Lacto phenol cotton blue stain and fungal slide culture technique, the isolated fungal strains were identified. The reliable method of enumerating fungi is the standard plate count.

RESULTS AND DISCUSSIONS

The water quality is altered due to rubber sediments especially in the second and third stations. All three aquatic stations are evidently infected by sewage and domestic wastes. The pH value is measured as 6.7, 6.8 and 6.5 respectively. Conductivity varies from 69 μ S/cm, 72 μ S/cm to 90 μ S/cm. Turbidity shows an equal measure of 2NTU, 2NTU, 2NTU in all three sites. TDS was marked with site 1- 47mg/l, 2- 48mg/l and 3- 62 mg/l. The TSS figured out as zero. Total hardness was recorded as 45mg/l, 50mg/l, 50 mg/l in general. Calcium as CaCO₃ was found 15mg/l, 14mg/l and 20 mg/l. Presence of Chloride was 31mg/l, 24mg/l and 32 mg/l in station 1, 2, and 3 respectively. Sulphate was amounted to be 2mg/l, 7mg/l and 0.8mg/l. Ammonium and Phosphate figured out as NIL. Iron was found to be 0.1 mg/l for all three sites. Fluoride was 0.2 mg/l for all three sites. The absence of phosphate in water samples may be due to that water is collected from the upper reaches of the river. The phosphate may be added in the further course of the river. Sheeja and co-workers [7] reported the increase of nutrients during the flow of the same river. Hence it is noted that sufficient nutrients should be added if the upper reaches water is directly used for irrigation. BOD pointed out as 9mg/l, 8mg/l and 11mg/l where as COD was categorized to 27mg/l, 32mg/l, and 33mg/l. Alkalinity Methyl Orange was found to be 31mg/l, 34mg/l and 28mg/l in stations 1, 2, and 3 respectively. Nitrate shows the presence of 0.16mg/l, 0.64mg/l and 0.2 mg/l. The physico-chemical characteristics recorded were within the permissible limit and it seems to be least polluted as the samples were collected in the stations near the origin of the river.

In all three stations fungi were isolated by dilution plating technique (Table 2). Only two species of fungi were identified, they are *Aspergillus* and *Chaetomium* species. Fungi are ubiquitous and achlorophyllous and heterotrophic organisms and they are directly influenced by environment factors. Commonly, aquatic fungi contribute significantly in aquatic ecosystem as decomposers of animal and plant remains [8].

TABLE 1 Physico chemical charecteristics of water collected from three different stations.

Parameters	Unit	S1	S2	S3
Color and appearance		Clear	Clear	Clear
pH		6.7	6.8	6.5
Conductivity	μS/cm	69	72	90
Turbidity	NTU	2	2	2
TDS	mg/L	47	48	62
TSS	mg/L	NIL	NIL	NIL
Total Hardness	mg/L	45	50	50
Calcium as CaCO ₃	mg/L	15	14	20
Chloride	mg/L	31	24	32
Sulphate	mg/L	2	7	0.8
Ammonium	mg/L	NIL	NIL	NIL
Phosphate	mg/L	NIL	NIL	NIL
Iron	mg/L	0.1	0.1	0.1
Fluoride	mg/L	0.2	0.2	0.2
BOD	mg/L	9	8	11
COD	mg/L	27	32	33
Alkalinity Methyl Orange	mg/L	31	34	28
Nitrate	mg/L	0.16	0.64	0.2

TABLE 2 Fungi isolates from three sampling stations

S.No	Fungi	Stations		
		S1	S2	S3
1.	<i>Aspergillus sp</i>	-	+	+
2.	<i>Chaetomium s</i>	+	-	-

+ Present

- Absent

TABLE 3 The characteristics of sampling stations

River Sites	Degradations	Depth of water
Kothaiyar	Forest area – no degradation	2 to 3ft in usual 5 to 6ft or above in rainfall season
Kuttiyar	Rubber plantations within forest accumulation results bad odor	2 to 3ft in usual 5 to 6ft or above in rainfall season
Mothitramalai	Rubber plantations within forest accumulation results bad odor	2 to 3ft in usual 5 to 6ft or above in rainfall season

CONCLUSION

The exploration of this parameters and the presence of fungi points out the need of water management. Before degradation of water occur to the maximum level when the river joins the Sea, the river sites of its origin do have microbial aquatic fungi. Therefore for the use of human beings and life sustaining creature treatment of river water is highly essential.

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