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Some Seasonal Changes in the Physico - Chemical Parameters of Thamirabarani Estuary

Zoology

KEYWORDS : Thamirabarani Estuary, Punnaikayal, Pazhayakayal, Total Alkalinity, Chloride, Nitrate, Ammonia, Sulphate, Phosphate, Tidy's

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ABSTRACT

Thamirabarani River is one of the major rivers in Tamilnadu. Urbanization and Industrialization are the major factors for determining the changes of Physico Chemical parameters. This study mainly focused on the seasonal changes of the Physico Chemical parameters in Thamirabarani river estuary. During the year 2011 to 2013, all seasonal changes were obtained especially Total Alkalinity, Chloride, Nitrate, Sulphate, Phosphate, Ammonia and Tidy's. During the summer and monsoon time, most of the parameters are changed due to the rainfall and fresh water floating. Seasonal variation of different parameters were as follows: total alkalinity (161 – 116 Mg/l), Chloride (29894- 9180 Mg/l), Nitrate (2 1Mg/l), Ammonia (up to 0.8), Sulphate (2985 – 1760Mg/l), Phosphate (up to 0.5 Mg/l) and Tidy's (3.10 – 0.92 Mg/l).

Introduction

Water is one of the most powerful components in living organism. Water is mainly collected from various resource like river, lakes ground water etc. These resources are mingled with human life. River is one of the important sources for these resources. Rivers are playing a vital role in aquatic environment. Rivers are one of the most important fresh water resources for agriculture, industry, domestic purpose. Sometimes rivers carry a large level of domestic and human waste, industrial waste and agricultural waste from terrestrial environment to coastal environment. Thamirabarani River is one of the most important river in south India. This river is the major aquatic resource in south Tamilnadu especially Tirunelveli Tuticorin and Kayakumari Districts. This river originate from western goats and reaches at Gulf of Mannar region.

Nowadays this river is being polluted by some major and minor industries beside the river from the originated area. The major pollutants are Sun Paper Mill at Cheranmagadevi, Textile Mill at VK Puram, Tirunelveli Dist and DCW at Arumuganeri, Tuticorin Dist and some minor industries are also a pollutant to this river. Most of these pollutants mainly create the pollution at monsoon period. At this monsoon period, heavy rainfall and fresh water floating is very high, so mainly during this season, all waste merges with this river. In this season river carry a high level pollution from originating area.

Finally, this river merged with part of Gulf of Mannar at Punnaikayal and Pazhayakayal Estuary. These two estuaries are nearly 1 Km distance from each another. In and around 5Kms distance from these estuaries, high level salt band waste, industries wastes, agricultural wastes and manmade waste are disposed directly.

Mainly this research focus on these estuaries, for any seasonal changes of physico chemical or contaminated by some external or influenced factors. During the year of 2011 to 2013, at every season the parameters are measured. In this present study, the aim is to find out the seasonal changes in some physic chemical parameters of Thamirabarani Estuary.

Materials and Method

In this study area, Thamirabarani Estuarine is located between latitude 8.641316N, longitude 78.127298E.The present investigation is carried out in two stations 1, Punnaikayal and 2, Pazhayakayal mouth of Thamirabarani Estuary. Samples are collected every season from June 2011 to May 2013. Samples were collected during early morning time of Summer, Pre-Monsoon, Monsoon and Post-Monsoon. Water samples were collected in plastic containers. Water samples were analyzed for different parameters by WHO method. The parameters like, Total Alkalinity, Chloride, Nitrate, Ammonia, Sulphate, Phospate and Tidy's.

Result and Discussion

Total Alkalinity

Stations	Year	TOTAL ALKALNITY (Mg/l)			
		Pre Monsoon	Monsoon	Post Monsoon	Summer
station 1	2011 -2012	125	116	141	134
	2012 - 2013	157	148	150	154
station 2	2011 -2012	137	124	161	156
	2012 - 2013	133	126	128	132

Total Alkalinity denotes the acid neutralizing capacity of water (Lawson 2011) has observed total alkalinity at Nigeria. The range of Total Alkalinity, minimum and maximum value (20.50 Mg/l to 90 Mg/l). This value is sufficient for survival of metabolic and physiology of aquatic organism. These values come under the WHO permissible limit. Sheeja etal (2008) analyzed the Total Alkalinity at Thamirabarani River, which is the highest level of Alkalinity presents during the Sea water influence.

In this present study, high level of alkalinity (161Mg.l) is observed in the post monsoon season at station II and low level of alkalinity (116Mg/l) in monsoon at station I. During the monsoon, high level of fresh water may determine the alkalinity.

Chloride (Cl)

Stations	Year	Chloride (Mg/l)			
		Pre Monsoon	Monsoon	Post Monsoon	Summer
station 1	2011 -2012	23460	20640	15810	24620
	2012 - 2013	29640	28454	29023	29894
station 2	2011 -2012	24868	21760	9180	20840
	2012 - 2013	27840	26726	27261	28079

Chlorides are not utilized directly and indirectly for aquatic plants growth and hence its existence in the aquatic system is regarded as pollution. Jeyalakshmi etal (2011) have assessed the chloride value high (980 Mg/l) level and low level (22.3Mg/l). According to them, high level of chloride presented at polluted area water with the influence of agricultural waste from contaminated with pesticides.

In this present study the highest chloride value (29894Mg/l) is observed at station I in summer season and lowest value (9180 Mg/l) observed at station II in pre monsoon season. During the summer, absence of fresh water floating and high level of indus-

trial, agricultural and manmade waste may increase the chloride level.

Nitrate (No3)

Stations	Year	Nitrate (Mg/l)			
		Pre Monsoon	Monsoon	Post Monsoon	Summer
station 1	2011 -2012	2	1	2	1
	2012 - 2013	2	2	2	2
station 2	2011 -2012	2	1	2	1
	2012 - 2013	2	2	2	2

Prasanna and Ranjan(2010) have explained the range of nitrate level at Dhamra Estuary. The high level of Nitrate is analyzed in pre monsoon and low level in post monsoon due to the domestic sewage and agricultural waste in that area.

In this present study, maximum level of Nitrate present at pre and post monsoon and the minimum level present in monsoon and summer season. During the pre and post monsoon time high level on industrial effluent may increase the Nitrate and high level of fresh water floating may reduce the Nitrate concentration in the monsoon time.

Ammonia (NH3)

Stations	Year	AMMONIA			
		Pre Monsoon	Monsoon	Post Monsoon	Summer
station 1	2011 -2012	0	0	0	0
	2012 - 2013	0	0	0	0
station 2	2011 -2012	0	0	0.08	0.02
	2012 - 2013	0	0	0	0

Ammonia level in excess of the recommended it may harm aquatic life. Although the ammonia molecule is a nutrient required for life, excess may be accumulate in the organism and cause alteration of metabolism or increase in body pH. It is an indicator of pollution from the excessive usage of ammonia rich fertilizer. According to Prasanna and Ranjan (2010), industrial effluents mainly determine the ammonia level at Dhamra Estuary.

In this present study, ammonia is in high level at station II in the post monsoon and it is in low level at station I in Summer time. Salt bonds waste and other industrial waste may increase ammonia level because a large number of salt bands are presented in around these Estuaries.

Sulphate (SO4)

Stations	Year	Sulphate as SO4			
		Pre Monsoon	Monsoon	Post Monsoon	Summer
station 1	2011 -2012	2250	2060	2250	2060
	2012 - 2013	2960	2842	2898	2985
station 2	2011 -2012	2385	2170	1910	1760
	2012 - 2013	2750	2640	2693	2774

Sulphate is common in natural waters but it can be increased from industrial waste. Jeyalakshmi etal (2011) have indicated sulphate level at Vijayawada. They concluded agricultural and industrial waste with sulphuric acid and aluminum sulphate were the major factors for the increase or decrease of sulphate level in water.

In this study, during summer the highest level and lowest level at station II is (2985Mg/l), (1769Mg/l) and high concentration of industrial waste and absence of rainfall may increase the sulphate level.

Phosphate (PO4)

Stations	Year	Phosphate (Mg/l)			
		Pre Monsoon	Monsoon	Post Monsoon	Summer
station 1	2011 -2012	0.4	0.4	0.0	0.0
	2012 - 2013	0.4	0.36	0.40	0.44
station 2	2011 -2012	0.5	0.5	0.0	0.0
	2012 - 2013	0.4	0.32	0.36	0.44

Nutrients were considered as one of the most important parameters in the aquatic environment for growth reproduction and metabolic activity. Ashok Prabu etal(2008) have clearly indicated, high level phosphate at Monsoon time and low level at summer time due to the presence and absence of fresh water and salinity at Pitchavaram Mangroves. In this present study, there is phosphate level (0.5Mg/l) at station II in monsoon time and absence of Phosphate during summer time. During monsoon agricultural waste domestic waste directly mingled with river water. Now a day's in addition to this super phosphate applied to the agricultural field as fertilizers and alkyl phosphate used in house hold as detergents which is the other source of inorganic phosphate also mingle with river water (Tiwari and Nair 1993).

Tidy's

Stations	Year	Tidy's as O2			
		Pre Monsoon	Monsoon	Post Monsoon	Summer
station 1	2011 -2012	2.18	2.16	1.12	2.20
	2012 - 2013	3.10	2.80	2.84	2.88
station 2	2011 -2012	2.24	2.24	0.92	2.16
	2012 - 2013	3.00	2.72	2.76	2.80

Sheeja etal(2008) have measured maximum level in thengapattinam Mouth and Minimum level in Petchiparai. In this study maximum (3.10Mg/l) level in pre monsoon at station I and Minimum level (0.92 Mg/l) in post monsoon at station II.

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