



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2019; 8(7): 189-192

© 2019 TPI

www.thepharmajournal.com

Received: 10-05-2019

Accepted: 12-06-2019

Dr. F Esther Isabella Eucharista

Assistant Professor of PG
Zoology, Aditanar College of
Arts & Science, Tiruchendur,
Tamil Nadu, India

Assessment of physicochemical characteristics of the estuary water at punnaikayal

Dr. F Esther Isabella Eucharista

Abstract

Estuary as a complex system receives huge quantity of dissolved chemical input from a number of sources as runoffs through the course of river. In addition, it is well known that human activities like industrialization, urbanization, tourism and domestic waste are affecting to the water quality. The punnaikayal estuary located within the Thoothukudi district with Latitude 8o38'19.2" N Long 78o 07' 09.8" E. The parameters such as pH (7.97 ± 0.32), Calcium (1440 ± 36.44 mg/l) and Magnesium (528 ± 36.22 mg/l) were revealed highest concentrations during March, while salinity (22.56 ± 0.57 g/l) during January and TDS (37590 ± 451.774 g/l) in February. In general estuary water was good and maintains stable and healthy aquatic ecosystem. The mean values recorded for all the parameters could support aquatic life. This study helps to know the various factors influencing these ecosystems and there by conservation measures are initiated in collaboration with local NGO's for protection of these mangrove swamps.

Keywords: Physico-chemical parameters, estuary, mangrove swamps

Objectives

- Our present study has been undertaken, the following objective's such as
- To assess the physic chemical parameters of the estuary water at Punnaikayal.
- To evaluate the standard deviation.
- To assess Pearson correlation matrix of the estuary water.
- Comparing the values obtained from analysis with that of WHO guide lines.

Study Area

The present study was conducted in the Punnaikayal estuary (lat 8 38'19.2" N Long 78 07' 09.8" E) located in the thoothukudi district of Tamilnadu state and lying along the, south west coast of India (figure-1). The estuary is formed by the confluence of river Tamirabarani in Punnaikayal. Punnaikayal estuarine area is having a total mangrove area of about 7 sq.km. The mangrove trees *Avicennia* sp, and *Rhizophora* sp, are available in this area and *Avicennia* sp, is dominant. The estuary covers a length of 9 km and depth of 1-2.5 m.

Punnaikayal estuary is the only perennial estuary in thoothukudi of Gulf of Mannar. During heavy inflow in the estuary the sand bar opens up under the force of gravity. The direct discharge of faecal and fish wastes dump into the estuary causes great havoc to the abiotic and biotic factors of the estuarine ecosystem.

The sample was collected in the mouth of the estuary. The bar mouth with dynamic human activities such as public latrine was identified.

Sample Collection

Water sample were collected every month during January 2018 to March 2018, at an interval of 11.00 am (Figure-2). Surface water samples were collected in pre-cleaned and acid washed polypropylene bottle of 1liter capacity and immediately kept in an ice box and transported to the laboratory to avoid contamination.

Statistical Analysis

Statistical analysis was conducted using the Microsoft Excel version 2007. The results for the physic-chemical analysis, mentioned above, are represented by mean \pm standard deviation. The Pearson correlation analyses were carried out to determine significant correlation between /variables in hydrology.

Correspondence

Dr. F Esther Isabella Eucharista

Assistant Professor of PG
Zoology, Aditanar College of
Arts & Science, Tiruchendur,
Tamil Nadu, India

Methodology

Physico- chemical characteristics of estuary water was assessed through the standard protocol suggested by APHA

(2005) [1]. The pH was measured by using HACH portable pH meter. Salinity was estimated by digital Refractometer.



Fig 1: Satellite Map Showing the Study Area



Fig 2: The Process of Collection of Estuary Water Sample

Results and Discussion

pH

Hydrogen ion concentration (pH) In surface water remained alkaline throughout the study period with no mark difference maximum value (7.97 ± 0.32) during the month of March and minimum value (7.02 ± 0.12) during the month of February was recorded (Figure-3).

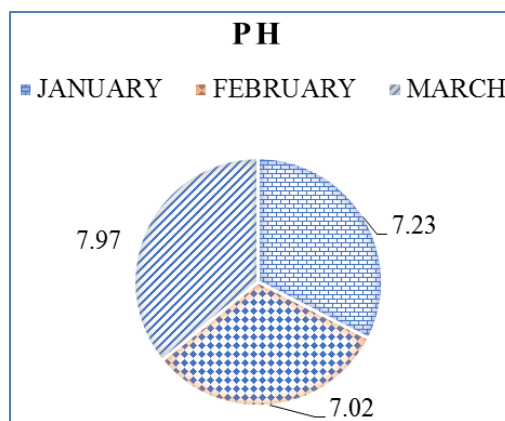


Fig 3: Graph showing parameters pH of estuary water January to March 2018

The estuary water sample however indicated negative correlation between pH and TDS ($r=-0.968$). There is a significant correlation between pH and Ca ($r=0.898$) (Table-1) and while positive correlation was observed pH and Mg ($r=0.601$). Similarly reported by kalaiarasi *et al*, 2012 [6]. The highest concentration of pH may be due to the influence of the seawater entry or seepage from sea. These observations were made by prasanthan and vasudevan nair (2000) [9].

Table 1: Pearson Correlation Physico Chemical Parameters of Punnaikayal Estuary during the Study Period

Parameters	pH	Salinity(g/l)	TDS (mg/l)	Calcium(mg/l)	Magnesium(mg/l)
pH	1				
Salinity(g/l)	-0.052	1			
TDS (mg/l)	-0.968	0.410	1		
Calcium(mg/l)	0.898*	-0.903	-0.760	1	
Magnesium(mg/l)	0.601	-0.999	-0.383	0.891*	1

** Correlation is highly significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Salinity

Highest salinity concentration was observed during the month of January as 22.56 ± 0.57 g/l. The lowest salinity concentration was obtained during the month of March as 18.813 ± 0.50 g/l. Salinity values fluctuated between 18.813 ± 0.50 to 22.564 ± 0.57 g/l (Figure-4). The salinity showed a regular trend of variation with tides.

The estuary water samples however indicated positive correlation between salinity and TDS ($r= 0.410$ g/l) and while

negative correlation was observed salinity and Ca ($r=-0.903$ g/l).

The presence of higher salinity was due to the influence of higher solar radiation and the domination of adjacent neritic water into the study area with the decrease in fresh water flow in the mangrove environment. This is in close conformity with Govindasamy *et al*, 2000; Ashok Prabu *et al*, 2008; G.U Usha Kiranmai *et al.*, 2015 [5, 2, 3].

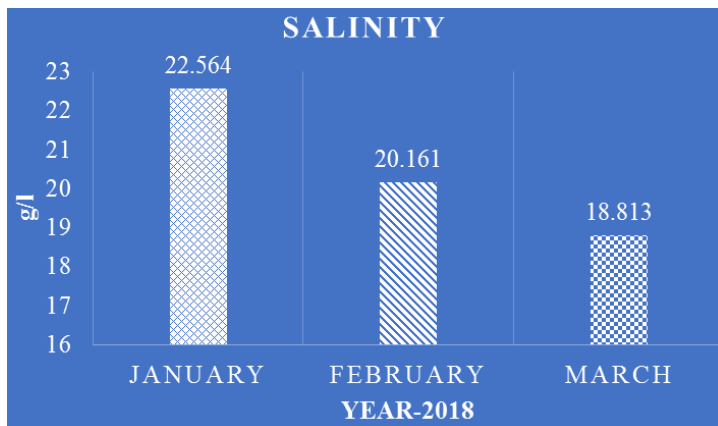


Fig 4: Graph showing parameters Salinity of estuary water January to March 2018

TDS

Total dissolved solids (TDS) of surface water varied from (30000 mg/l to 37590mg/l). The TDS value was maximum in February 37590±451.774 mg/l and minimum were observed during March 30000±1748.99 mg/l (Figure-5). The salinity estuary water sample indicated negative correlation between

TDS and Ca ($r = -0.760$ mg/l); TDS and Mg ($r = -0.383$ mg/l) in the mangrove environment.

The highest TDS content range may be due to floating materials like fine silt and detritus carried by rain water from the catchment. This confirmed with previous observations made by Dwivedi *et al*, (2012) [8].

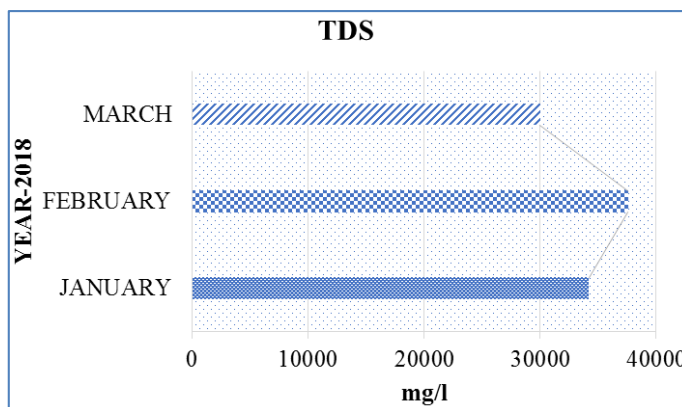


Fig 5: Graph showing parameters TDS of estuary water January to March 2018

Calcium

Calcium value was found higher 1440±36.44 (mg/l) during March and lower value was obtained 1120±27.17 (mg/l) during January (Figure-6). The estuary water sample indicated significant positive correlation between Calcium and

Magnesium ($r = 0.891$ g/l).

The high amount of calcium was due to the influx of riverine sources. Similar results were reported by Gadhia *et al*, (2012) [4].

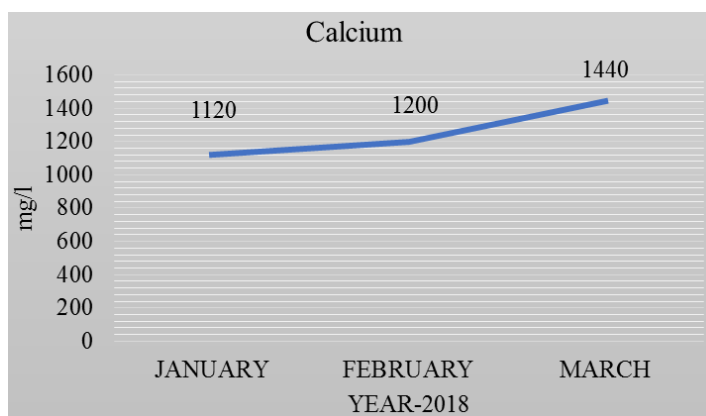


Fig 6: Graph showing parameters Calcium of estuary water January to March 2018

Magnesium

Magnesium value was found higher 528±36.22 (mg/l) during

March and lower value was obtained 384±42.00 (mg/l) during January (Figure-7).

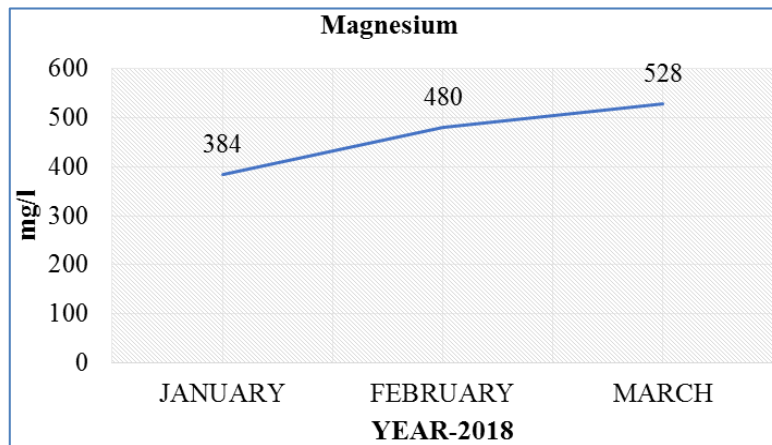


Fig 7: Graph showing parameters Magnesium of estuary water January to March 2018

The maximum values of Magnesium might be due to their exchange with other cations during early stages of mixing and their removal due to their involvement in biological or geochemical processes. This is in close conformity with Panigrahy *et al*, (1999) ^[7] in the coastal waters around Orissa.

Conclusion

- ✓ The present study indicated the physic chemical status of the estuary waters at Punnaikayal. In general estuary water was good and maintains stable and healthy aquatic ecosystem.
- ✓ However, estuary water the physic-chemical parameters were not very much variable. The fluctuations in physic-chemical parameters influence the natural activity and efficiency of marine organism.
- ✓ The fisheries activities were carried out in the region and it was known that the physical and chemical properties are important for the food chain in the aquatic environment.
- ✓ The mean values recorded for all the parameters could support aquatic life. As result it is essential that Punnaikayal mangrove health in estuary environment should require a regular monitoring.

Recommendations

- Enforcement of environment laws and obeisance of maritime estuary should be taken more seriously in the estuary maritime
- More funds should be channeled to researches based on physic-chemical analysis; biomass estimate in punnaikayal estuary Mangroves ecosystem.
- Training and sensitization of fisher folks on responsible fisheries and basic record-keeping habits should be conducted at regular intervals.

References

1. APHA. Standard methods for examination of water and wastewater. 21st Edition., Washington. D.C, 2005.
2. Ashok Prabu V, Rajkumar M, Perumal P. Seasonal variations in physic- chemical characteristics of Pichvaram Mangroves, southeast coast of India. J. Environ. Biol. 2008; 29(6):945-950.
3. Usha kiramai G, Rajan sekhar PS. Analysis of Physico-chemical of Mangroves and wetland soils of Visakhapatnam coast, Bay of Bengal. India. International Journal of Innovative research and creative Technology. 2015; 2(2):66-64.

4. Gadhia M, Surana R, Ansari E. Seasonal variation in physic-chemical characteristics of Tapi Estuary in Hazira Industrial Area/our nature. 2012; 10:249-257.
5. Govindasamy C, Kannan L, Azariah J. Seasonal variation in physico-chemical properties and primary production in the coastal water biotopes of Coromandel coast, India. J. Environ. Biol. 2000; 21:1-7.
6. Kalaiarasi M, Paul P, Lathasumathi C, Stella C. Seasonal variations in the physico-chemical characteristics of the two coastal waters of Palk –Strait in Tamil Nadu. India global journal of environmental research. 2012; 6(2):66-74.
7. Panigrahy PK, Das J, Das SN, Sahoo RK. Evaluation of the influence of various physicochemical parameters on coastal water quality, around Orissa, by factor analysis. Indian Journal of Marine Sciences. 1999; 28:360-364.
8. Dhananja Y, Dwivedi, Vijay R, Chourey. Physico-chemical Characterization of Water Body with Special Reference to Battery, Power Sources and Metal Plating Effluents Curr. World Environ. 2012; 7(1):125-131.
9. Prasanthan V, Vasudevan Nair T. Impact assessment: hydrological parameters on Parvathy puthan. Ar. Poll. Res. 2000; 19(3):475-477.