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Research Article

PHYSICO-CHEMICAL CHARACTERISTICS OF THE ESTUARY WATER AT PUNNAIKAYAL

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ABSTRACT

Estuary as a complex system receive shug equantity of dissolved chemical in put from a n umber of source sasrun of fsthrough the course of river. In addition, it is well known that human activities like in dustrialization, urbanization, tourism and domestic waste are affecting to the water quality. The pun naikayale stuary located with in the Thoothukudi district with Latitude 8o38'19.2" NLong 78o07'09.8" E. The parameters such as pH (7.97±0.32), Calcium (1440±36.44mg/l)and Magnesium (528±36.22mg/l)were revealed highest con cent rations during March, while salinity (22.56±0.57g/l) during January and TDS(37590±451.774 g/l) in February. No significant variations were observed at any of the sampling sites. In generals tuary water was good and maintains table and health yaquaticeco system. The mean values recor dedforall the parameters could support a quaticlife . This study helps to know the various factors influencing the see cosytems and there by conservation measures are in itiatedin collaboration with local NGO's for protection of these mangroves wamps.

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INTRODUCTION

- ✓ Our present study has been undertaken, the following objective's such as
- ✓ To assess the physic chemical parameters of thee stuary water at Punnaikayal.
- ✓ To evaluate the standard deviation.
- ✓ To calculate the analysis of variance.
- ✓ Comparing the value so btained from analysis with that of WHO guidelines.

Studyarea

The present study was conducted in the Punnaikaya lestuary (lat 838'19.2" NLong7807'09.8" E)located in the thoothukudi district of Tamilnadu state and lyingalongthe, south west tocast of India(figure-1).Thee tuary is formed by the confluence of river Tamira barani in Punnaikayal. Punnaikaya lestuar in earea is having a total mangrove areao fabout 7sq.km. The mangrove trees Avicenniasp, and Rhizoporasp, are available in this area and Avicenniasp, is dominant. Thee stuary covers a length of 9km and depthofl-2.5 m.

Punnaikaya lestuary is the on lyperennia lestuary in thoothukudi of Gulf of Mannar. During heavy in flow in thee stuary the sand bar open supunder the for ceof gravity. The directd is charge of faecal and fish wastes dump into thee stuary causes greatha vocto the abiotic and biotic factors of thee stuarineeco system.The sample was collected in the mouth of thee stuary. The bar mouth with dynamic human activities

such as publiclatrine was identified.

Sample Collection

Water sample were collected every month during January2018 to March 2018, a taninterval of 11.00am (Figure-2). Surface water samples were collected in pre-cleaned and acid washed polypropylene bottle of 1 letter capacity and immediately keptinanic box and transported to the laboratory to avoid contamination.

Statistic Alanalysis

Statistical analysis was conducted using the Microsoft Excel version 2007 . The results for the physic-chemical analysis, mentioned above, are represented by mean ± standard deviation. Significance Of estuary variation was compared by using single factorANOVA.

METHODOLOGY

Physico- chemical characteristics of estuary water was assessed through the standard protocol suggested by APHA (2005). The pH was measured by using HACH portable pH meter. Salinity was estimated by digital Re fractometer.

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Figure 1 satellitemapshowing



Figure 2 The Process

The study Area

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 marked 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).

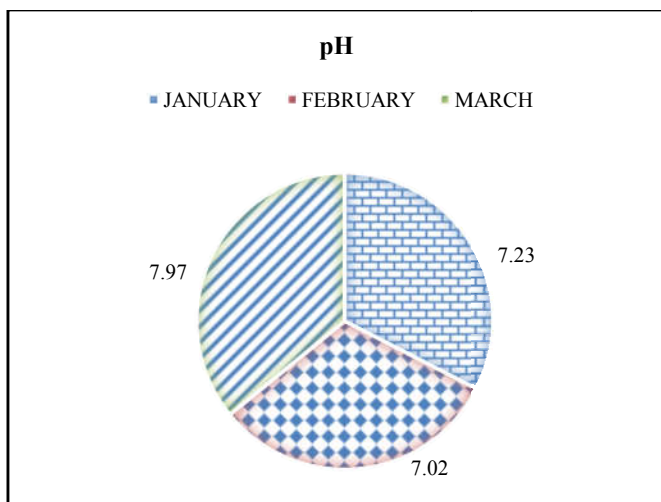


Figure 3 Graph showing parameters of estuary water January to March 2018

The pH levels did not show statistically significant variation among the sampling sites during the study period (Table-1). Similarly reported by Kalaiarasi *et al.*, 2012. The highest

concentration of pH may be due to the influence of the sea water entry or sea breeze. These observations were made by Prasad and Vasu De Vannair (2000).

Table 1 One-way ANOVA Showing Difference Between Months and pH Parameter in the Punnaikayal Estuary

Months	Source of Variation	SS	df	MS	F-Value	P-Value	
January	Between the Sites	53001.31	1	53001.31	1.005033	0.34	P>0.05 NS
	Within the Sites	421887	8	52735.87			
February	Between the Sites	0.18496	1	0.18496	0.291344	0.60	P>0.05 NS
	Within the Sites	5.0788	8	0.63485			
March	Between the Sites	0.16641	1	0.16641	0.630807	0.44	P>0.05 NS
	Within the Sites	2.11044	8	0.263805			

Salinity

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

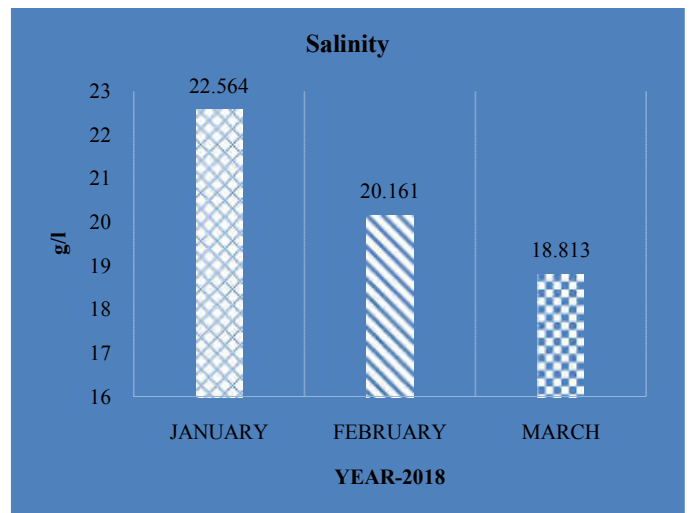


Figure 4 Graph showing parameters Salinity of estuary water January to March 2018

There is no significant difference between salinity among the sites during the study period (Table-2). 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.Usha Kiranmai *et al.*, 2015.

Table 2 One-way ANOVA Showing Difference Between Months and Salinity Parameters in the Punnaikayal Estuary

Months	Source of Variation	SS	df	MS	F-Value	P-Value	
January	Between the Sites	0.031923	1	0.031923	0.048355	0.83	P>0.05 NS
	Within the Sites	5.283596	8	0.66045			
February	Between the Sites	0.204204	1	0.204204	0.265121	0.36	P>0.05 NS
	Within the Sites	6.161829	8	0.770229			
March	Between the Sites	0.768398	1	0.768398	0.912843	0.36	P>0.05 NS
	Within the Sites	6.734112	8	0.841764			

TDS

Total dissolved solids (TDS) of surface water varied from (30000mg/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).

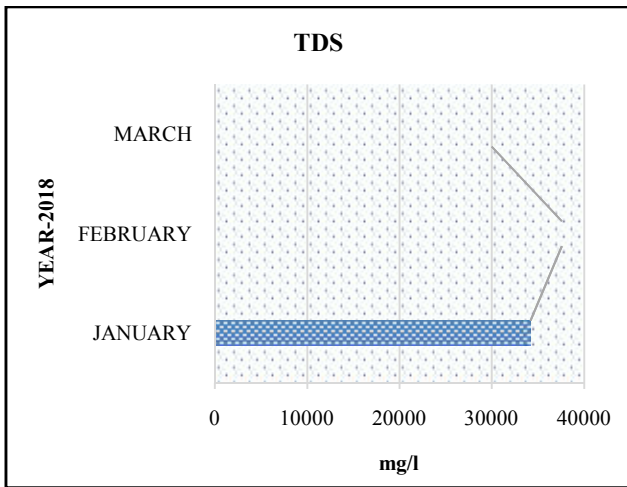


Figure 5 Graph showing parameters TDS of estuary water January to March 2018

There were no significant variations between TDS among the sites during the study period (Table-3). The highest TDS content range may be due to floating materials like finesilt and detritus carried by rain water from the catchment. This confirmed with previous observations made by Dwivedi *et al*, (2012).

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). There was no significant variation between calcium at any sampling sites during the study period (Table-4). The high amount of calcium was due to the influx of riverine sources. Similar results were reported by Gadhia *et al*, (2012).

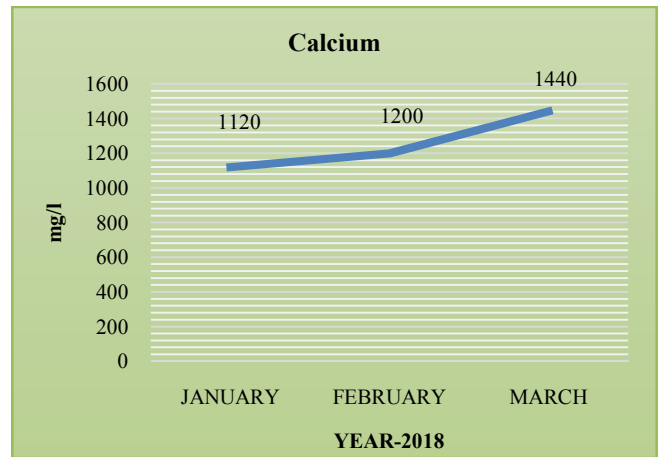


Figure 6 Graph showing parameters Calcium of estuary water January to March 2018

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).

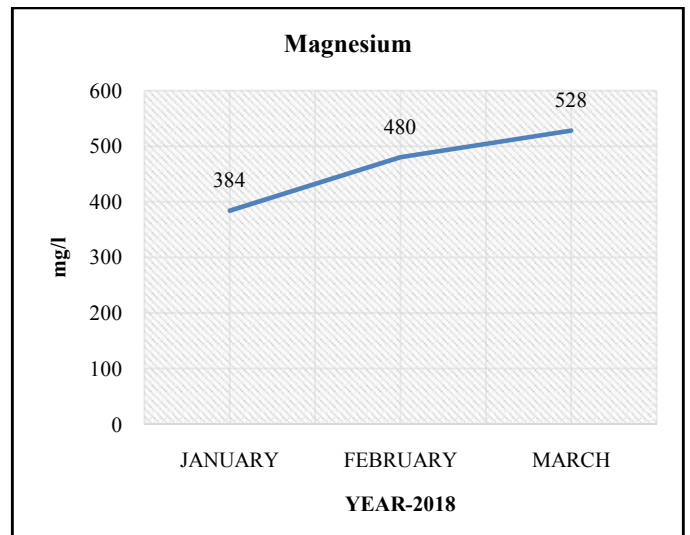


Figure 7 Graphs showing parameters Magnesium of estuary water January to March 2018

Table 3 One Way ANOVA Showing difference between months and TDS Parameters in the Punnaikayal Estuary

Months	Source of Variation	SS	df	MS	F-Value	P-Value	
January	Between the Sites	800324.1	1	800324.1	0.169226	0.69	NS
	Within the Sites	37834632	8	4729329			
February	Between the Sites	13488500	1	13488500	3.413534	0.10	NS
	Within the Sites	31611817	8	3951477			
March	Between the Sites	1009968	1	1009968	0.327014	0.58	NS
	Within the Sites	24707626	8	3088453			

Table 4 One Way ANOVA Showing Difference Between Months and Calcium Parameters in The Punnaikayal Estuary

Months	Source of Variation	SS	df	MS	F-Value	P-Value	
January	Between the Sites	108.9	1	108.9	0.001145	0.97	NS
	Within the Sites	760995.6	8	95124.45			
February	Between the Sites	30250	1	30250	1.641016	0.23	NS
	Within the Sites	147469.6	8	18433.7			
March	Between the Sites	47334.4	1	47334.4	1.040369	0.33	NS
	Within the Sites	363981.6	8	45497.7			

Magnesium levels did not show any significant variation at any sampling sites during the study period (Table-5). 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 conformity with Panigrahy *et al*, (1999) in the coastal waters around Orissa.

Table 5 One Way Nova Showing Difference Between Months And Magnesium Parameters in the Punnaikayal Estuary

Months	Source of Variation	SS	df	MS	F-Value	P-Value	
January	Between the Sites	3712465	1	3712468	113.7051	5.24	P>0.05 NS
	Within the Sites	261199.6	8	32649.95			
February	Between the Sites	476.1	1	476.1	0.164493	0.69	P>0.05 NS
	Within the Sites	23154.8	8	2894.35			
March	Between the Sites	384.4	1	384.4	0.162092	0.69	P>0.05 NS
	Within the Sites	18972	8	2371.5			

CONCLUSION

- ✓ The present study indicated the physic chemical status of the estuary waters at Punnaikayal. In general estuary water was good and mainly 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 organisms.
- ✓ 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 a result it is essential that Punnaikayal mangrove health in estuary environment should require regular monitoring.

Recommendations

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

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