Available online at www.journalijmrr.com

INTERNATIONAL JOURNAL OF MODERN RESEARCH AND REVIEWS

Int. J. Modn. Res. Revs.
Volume 3, Issue 10, pp 826-829, October, 2015

ISSN: 2347-8314

ORIGINAL ARTICLE

SEASONAL VARIATIONS OF WATER QUALITY PARAMETERS IN SOUTH EAST COASTAL WATERS OF TAMIL NADU, INDIA.

***R. Ravichelvan, S. Ramu and T. Anandaraj.**

M.R.Government Arts college,Mannargudi – 614 001, Tamil Nadu, India.

Article History: *Received 3rd September,2015, Accepted 13th October, 2015, Published 14th October,2015*

ABSTRACT

In the present study to investigate the physico chemical parameters of Adirampattinam (Station – I) and Mallipattinam (Station – II) Coastal waters during different seasons (July 2014 to June 2015). The water temperature fluctuated from 23 to 35^0C pH value varied from 7.9 to 8.8, salinity value ranged from 24 to 35 ppt, Dissolved oxygen ranged between 3.12 to 5.90 mg/lit, Total organic carbon fluctuated from 2.05 to 9.27 mg c/g, silicate content ranged from 22.16 to 70.16 µ mol / lit, Nitrate ranged between 0.22 to 0.86 µ mol / lit and sediment composition ranged from 71 to 78% (Sand), 11 to 24% (Silt) and 4 to 8% (Clay) respectively.

Keywords: Seasonal variations, water quality parameters, coastal waters, Sediment composition.

.

1.INTRODUCTION

Physico – chemical properties such as topography, water movement and stratification, temperature, pH, salinity, light availability, nutrients, sediment and soil texture of ambient marine environment play a significant role in controlling the distribution and composition of flora and fauna in a given environmental conditions (Sampathkumar and Kannan, 1998; Ajithkumar, *et al., 2006*).

The diversity, distribution and relative abundance of different organisms in the marine environment are influenced by the physico-chemical parameters of both the sediment and water. The hydrographical parameters of the biotopes are largely responsible for the biological productivity. Especially, the salinity, dissolved oxygen and organic matters play a key role in the biological processes. The changing nature of water, which directly influence s the general textures and character of the sediments and in turn, affects the biota. Infiltration of marine sediments by nutrients can have an influence on the biota and productivity of the ecosystem. In view of the importance and involvement of the hydrographical parameters in various biological processes, investigation of these parameters has become mandatory for any environmental monitoring studies (Solai *et al*., 2010; Srilatha *et al*., 2012).

Ecological studies are very important in marine environment for determining the challenges of water quality and for the general evaluation of the area. Physical and chemical parameters such as atmospheric temperature, water temperature, dissolved oxygen, salinity, pH, nitrite, nitrate, phosphate, and sediment total organic carbon, nitrogen, and phosphorus etc. play a pivotal role in an aquatic system. (Balasubramanian and Kannan, 2005).

Several hydro-chemical studies pertinent to soil characteristics were made in the coastal waters, which include horizontal and vertical distribution of organic carbon in the mangrove sediments have been studied in Cochin mangroves, south east coast of India by Sunilkumar (1996). The present study therefore, has been aimed to study seasonal fluctuations of water quality parameters at tow stations along the southeast coast of Muthupet and Adirampattinam during the period from July 2014 to June 2015.

2.MATERIALS AND METHODS

The water sample collected from Adirampattinam and Muthupet coastal region in Tamil Nadu, India during July 2014 June 2015. The calender year was divided into four district seasons viz., premonsoon (July – September), Monsoon (October – December), post monsoon (January – March) and summer (April – June).

Temperature was measured using a standard thermometer with $+0.5^0$C accuracy. Salinity was measured using a Hand Refracto meter (Atago Co. Ltd., Japan). The pH was measured using a battery operated pH pen (Eutech Instruments Singapore). Dissolved oxygen was analysed following the winkler's method (Stricland and Parsons,

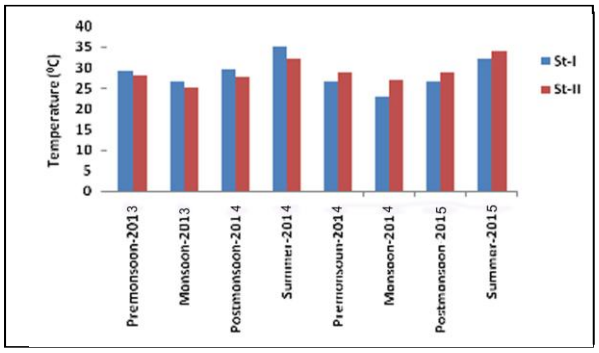
Corresponding author: Dr.R. Ravichelvan,** M.R.Government Arts college, Mannargudi – 614 001, Tamil Nadu, India.*

1986). Total organic carbon was measured by using the shade dried sediment samples were treated with 0.4N chronic acid and the resulting solution was titrated against 0.2N Ferrous ammonium sulphate using 0.025 N Ferrows phenanthrohine as indicator (Elwakeel and Riley, 1956). The values are expressed in mg c/g of sediment. The percentage composition of sand, slit and clay was worked out by the pipette method as proposed by Krumbein and Petijohn (1938) and values were plotted in bar chart.

3.RESULTS

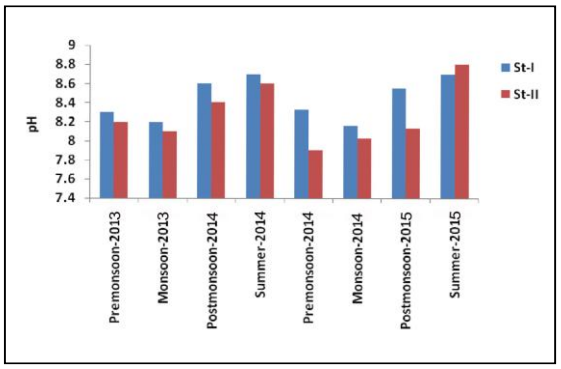
Temperature

The temperature fluctuated from 23 to 35^{0}C (28.57 ± 3.25) with maximum during summer (May 2014) at station I,and minimum during monsoon (December 2014) at station I (Fig. 1).



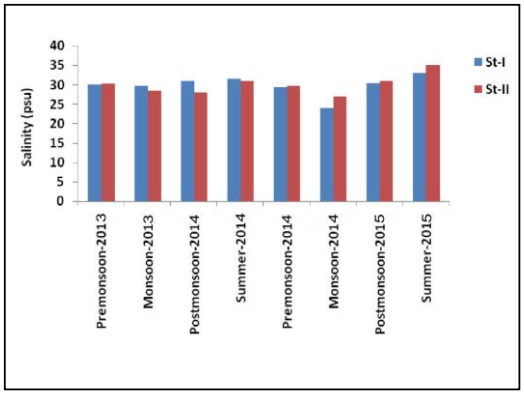
pH

The pH values ranged between 7.9 and 8.8 (8.44 ± 0.21) with minimum during premonsoon (September 2014) at station II and maximum in summer (June 2015) at station II (Fig. 2).



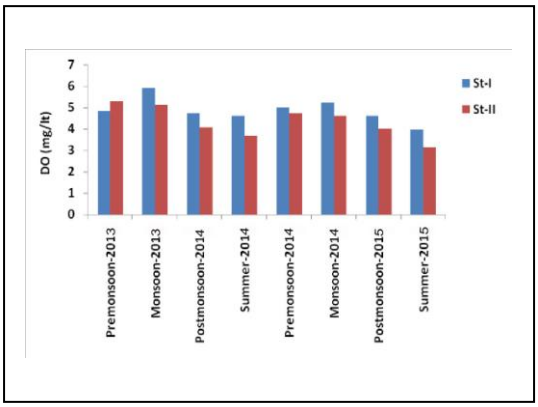
Salinity

The salinity varied from 24 to 35 ppt (30.40 ± 2.19) with maximum during summer (May,2015)at station II and minimum during monsoon (December,2014) at station I(Fig. 3).



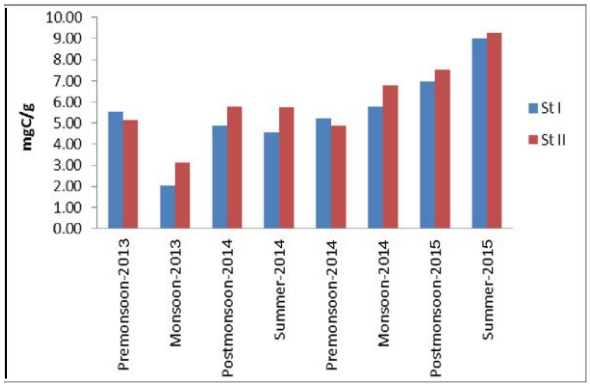
Dissolved Oxygen

The dissolved oxygen ranged between 3.12 and 5.90 mg/l (4.80±0.77) with maximum during monsoon (November 2013) at station I and minimum in summer (June 2015) at station II (Fig. 4).



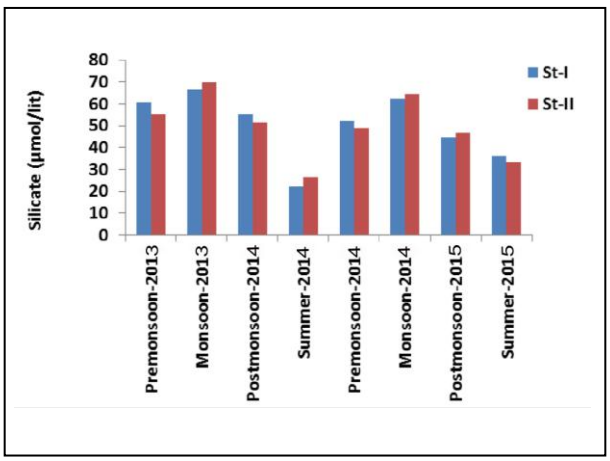
Total organic carbon

The total organic carbon fluctuated from 2.05 to 9.27mgC/g (4.52 ± 2.02) with minimum during monsoon (December 2013) at station I and maximum during summer (May 2015) at station II (Fig. 5).



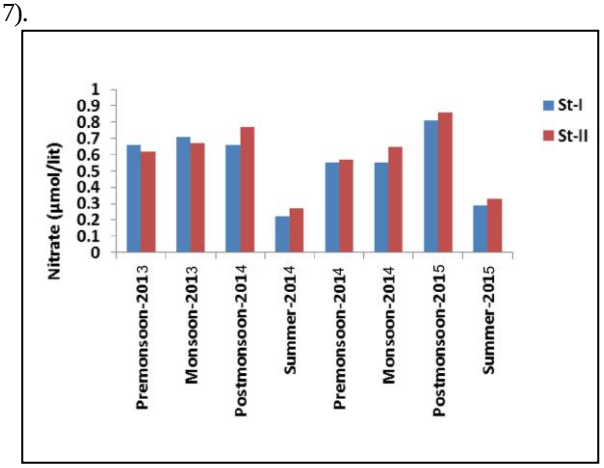
Silicate

The silicate content varied from 22.16 to 70.16 µmol/lit (39.47±13.23) with maximum were recorded during monsoon (November 2013) at station II and minimum in summer (May 2014) at station I (Fig. 6).



Nitrate

The nitrate ranged between 0.22 and 0.86 μmol/lit (0.44 ± 0.16) with maximum during postmonsoon (February 2015) at station II and minimum during summer (May 2014) at station I (Fig. 7).



a

Sediment composition

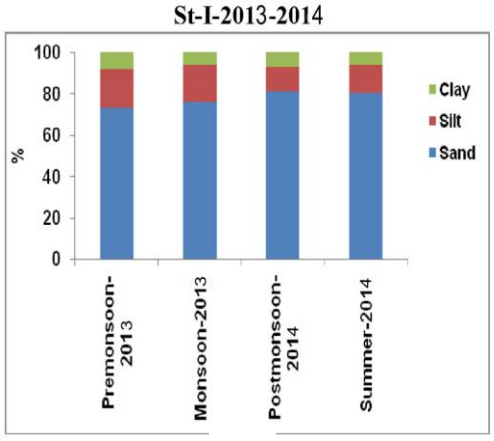
The percentage composition of sand ranged from 71 to 78% with the maximum sand in station I during premonsoon 2014 and minimum in station II during the postmonsoon 2015. The silt content varied from 11 to 24 % with maximum were recorded in station II during premonsoon 2013 and minimum in station II during summer 2014. The percentage of clay ranged between 4 to 8% with maximum level of clay was recorded in station I during postmonsoon 2015 and minimum in station II during monsoon 2014 (Fig. 8 a-d).

4.DISCUSSION

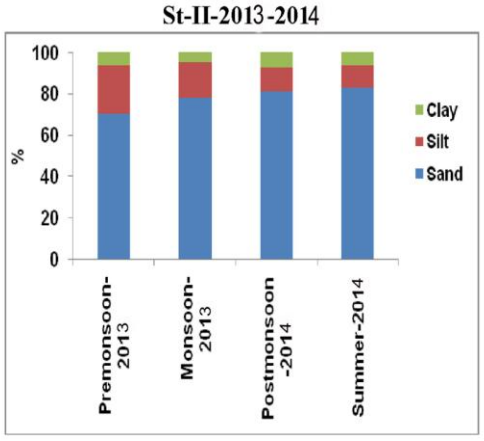
Temperature is an important ecological factor which influences the other hydrobiological parameters. The role of temperature for animal distribution in a particular area or niche is also well known. In the marine zone, the exclusion of certain species from areas with unsuitable temperature conditions is one of the major obvious effects of temperature on animal distribution (Choudhury *et al.*, 1984). Less obvious are the effects of temperature on growth rates, length of life, reproductive capacity and intra and interspecific competition. In fact, such effect may have some impact, directly or indirectly, on the distribution of communities (Parulekar *et al.*, 1980).

Like temperature, pH is also an important factor that determines the suitability of water for various purposes. The pH of water may influence many biological and chemical processes in natural waters (Saad, 1978). The pH values recorded presently did not show any different seasonal pattern with the range of variations which were very narrow. Higher values observed during postmonsoon could be ascribed to an increase in temperature and subsequent evaporation of water coupled with increased salinity (Upadhaya, 1998).

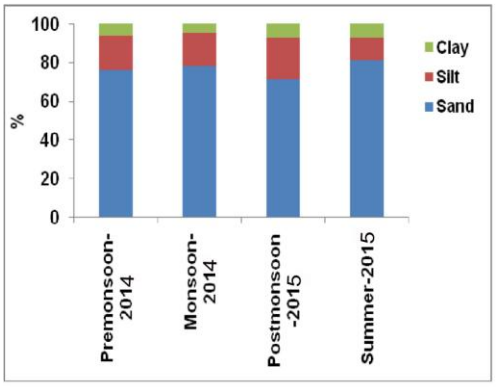
Salinity acts as a limiting factor in the distribution of living organisms and its variation influences the fauna in the intertidal zone. Generally, changes in salinity in the sea water habitats such as estuaries, backwaters and mangroves are due to the influx of freshwater from land runoff caused by monsoon or by tidal variations (Gibson, 1982).



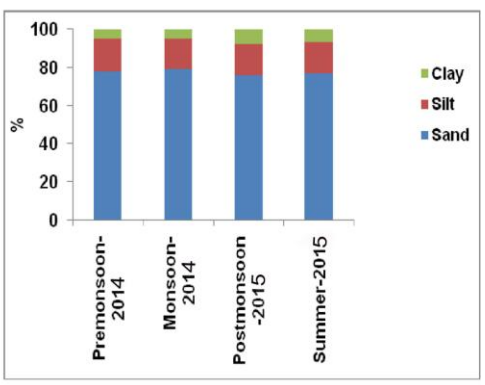
a



b



c



d

Generally higher dissolved oxygen concentration observed during monsoon season might be due to the cumulative effect of the higher wind velocity coupled with heavy rainfall and the resultant freshwater mixing (Prabu *et al*., 2008; Prasanna and Ranjan, 2010).

This trend of large amount of total organic carbon in summer, could be attributed to the effluent discharge and low amount in monsoon as evidenced by (Menon *et al*., 2000). The lower value of silicate content was observed earlier during postmonsoon and summer seasons by Jakher and Rawat (2003). The silicate content was higher than that of the other nutrients and influx of freshwater derived from land drainage carrying silicate leached out from rocks and also from the bottom sediment (Govindasamy *et al*., 2000; Rajasekar, 2003).

The higher nitrates value during monsoon season might be mainly due to the organic materials receiving from the catchment area during rainfall (Das *et al*., 1997). The increasing nitrates level is also due to freshwater inflow, litter fall decomposition and terrestrial run-off during the monsoon season as reported earlier for various researchers (Bragadeeswaran *et al*., 2007).

The organic carbon in estuarine sediments is derived from primary production within the aquatic ecosystem and also from terrestrial biota by transport of leached and eroded material into the river (Likens, 1972). The high organic carbon in the mangrove waters may be due to the mangrove and terrestrial detritus present in the suspended matter (Jagtap, 1987). The present study indicated that the hydrological status of the Southeast coastal waters of Muthupet and Adirampattinam is good in general. Present baseline information and study on water quality fluctuation is useful for further monitoring the anthropogenic levels and evaluate the health of the coastal ecosystems.

5.REFERENCES

Ajithkumar, T. T., T. Thangaradjou, and L. Kannan, 2006. Physico-chemical and biological properties of the Muthupettai mangrove in Tamil Nadu. *J. Mar. Biol. Ass. India*, **48**: 131-138.

Balasubramanian, R. and L. Kannan., 2005. Physico chemical characteristics of the coral reef environs of the Gulf of Mannar Bioshere Reserve, India. *Int. J. Ecol. Environ. Sci*., **31**: 265 – 271.

Bragadeeswaran, S., M. Rajasekar, M. Srinivasan, and U. Kanaga Rajan, 2007. Sediment texture and nutrients of Arasalar estuary, Karaikkal, South East Coast of India. *J. Environ. Biol.*, **28**: 237-240.

Choudhury, A., A. B. Bhunia, and S. Nandi, 1984. Preliminary survey on macrobenthos of Prentic Island, Sundarbans, West Bengal. *Rec. Zool. Surv. India*, **81**: 81-92.

Das, J., S. N. Das, and R. K. Sahoo, 1997. Semidiurnal variation of some physico-chemical parameters in the Mahanathi estuary, East Coast of India. *Indian J. Mar. Sci*., **26**: 323-326.

El Wakeel, S. K. and J. P. Riley, 1956. The determination of organic carbon in marine muds. *J. Cons. Per. lnt. Expl. Mer.,* **22**: 180-183.

Gibson, R. N., 1982. Recent studies on the biology of intertidal fishes. *Oceanogr. Mar. Biol. Annu. Rev.*, **20:** 363-414.

Govindasamy, C., L. Kannan, and A. Jayapaul Azariah, 2000. Seasonal variation in physico-chemical properties and primary production in the coastal water biotopes of Coromandal Coast, India. *J. Environ. Biol.*, **21**: 1-7.

Jagtap, T. G., 1987. Seasonal distribution of organic matter in mangrove environment of Goa. *Indian J. Mar. Sci.*, **16**: 103-106.

Jakher, G.R., and M. Rawat, 2003. Studies on physico-chemical parameters of a tropical lake, Jodhpur, Rajasthan, India. *J. Aqua. Biol.*, **18**: 79-83.

Krumbein, W. C. and F. J. Pettijohn, 1938. *Manual of Sedimentary Petrology*. New York, Appleton, Century and Crofts, lnc., 549 pp.

Likens, G.E., 1972. Nutrition and Eutrophication. Special Symposium American Society of Limnology and Oceanography, Lawrence, p.3.

Menon, N., A. N. Balchand and N. R. Menon, 2000. Hydrobiology of the Cochin backwater system – a review. *Hydrobiol.*, **430**: 149-183.

Parulekar, A. H., V. K. Dhargalakar, and S. Y. Singbal, 1980. Benthos studies in Goa estuaries III. Annual Cycle of Macrofaunal distributional production and trophic relations. *Indian J. Mar. Sci.*, **1**: 189-200 pp.

Prabu, V. A., M. Rajkumar, and P. Perumal, 2008. Seasonal variations in physico-chemical characteristics of Pichavaram mangroves, South East Coast of India. *J. Environ. Biol.*, **29:** (6): 945-950.

Prasanna, M., and J. M. Ranjan, 2010. Physico-chemical properties of water collected from Dharma estuary. *Intl. J. Environ. Sci.*, **1:** (3): 334-342.

Rajasekar, M., 2003. Physico-chemical characteristics of the Vellar estuary in relation to shrimp farming. *J. Environ. Biol.*, **24**: 95-101.

Saad, M. A. H., 1978. Seasonal variations of some physico-chemical conditions of Shatt-al-Arab estuary, Iran. *Estuar. Coast. Mar. Sci.*, **6**: 503-513.

Sampathkumar, P. and L. kannan, 1998. Seasonal variations in Physico- chemical characteristics in the Tranquebar – Nagapattinam region, southeast coast of India. *Pollut. Res.*, **17**: 397 – 402 pp.

Solai, A., M. Suresh Gandhi, and E. Sriram, 2010. Implications of physical parameters and trace elements in surface water off Pondicherry, Bay of Bengal, South East Coast of India. *Intl. J. Environ. Sci.*, **1**: 4.

Srilatha, G., B. Thilagavathi, and D. Varadharajan, 2012. Studies on the physico-chemical status of Muthupettai mangrove, South East Coast of India. *J. Adv. Appl. Sci. Res.*, **3**(1): 201-207.

Strickland, J. D. H. and T. I. Parsons, 1986. A manual of sea water analysis, (2 Ed.) *Bull. Fish. Res. Can*., **167**: 310 pp.

Sunilkumar, R., 1996. Distribution of organic carbon in the sediments of Cochin mangroves, South West Coast of India. *Indian J. Mar. Sci.*, **25**: 56-61.

Upadhaya, S., 1998. Physico-chemical characteristics of the Mahanadi estuarine ecosystem, east coast of India. *Indian J. Maar. Sci.*, **17**: 19-23.

*****