



Seasonal Variation in Water Temperature on the South East Coast of Tamil Nadu, India

John Peter Paul J.

Department of plant biology and plant biotechnology, St. Xavier's college
(autonomous), palayamkottai – 620 002, Tamil nadu, india.

Received: 24 October 2012; **Revised:** 7 November 2012; **Accepted:** 23 November 2012

Abstract: The present investigation was carried out to assess the water temperature at different stations of Kanyakumari region in the south east coast of Tamil Nadu from January 2007 to December 2010. The surface water temperature ranges between 24.32 to 29.36 °C. The maximum water temperature was observed in the summer season and the minimum water temperature was recorded during the post-monsoon season in all the selected stations. In the present study Vattakottai was found to have the maximum temperature and minimum temperature was observed in Kanyakumari station.

Keyword: Water temperature, Seasons, Stations and South east coast of Tamil Nadu

INTRODUCTION

The total life of the world depends on water and hence the hydrological study is very much essential to understand the relationship between its different trophic levels and food webs. The environmental conditions such as temperature, topography, water movement, stratification, salinity, oxygen and nutrients characterizing at particular water mass also determine the composition of its biota¹. Usually in the near shore waters and estuaries, temperature exhibit considerable seasonal variations depending on the local conditions of rainfall, tidal incursions, various abiotic and biotic processes, quantum of fresh water inflow affecting the nutrient cycle of different coastal environments².

Temperature is considered as one of the most important environmental factors which control all the atmospheric conditions and the biochemical reactions of aquatic system. Almost all the physical and chemical properties of marine water are determined by its temperature conditions. There are often variations in water temperature mainly due to seasonal changes and rainfall³. Both the atmospheric and water temperatures often get fluctuated with reference to the topography of the location and from season to season⁴. Temperature has also a significant influence on the growth and biochemical composition of marine communities⁵. All the organisms which are present only in marine water depend on water temperature. If any changes occur in marine water, this lead to change in the marine community also. Therefore in the present study, it was aimed to determine the amount of water temperature at different season in the selected stations of Kanyakumari region of the south east coast of Tamil Nadu.

MATERIALS AND METHODS

In the present study, the entire study area (Kanyakumari region) was divided into four stations for practical convenience. Station A₁ (Kanyakumari: Lat 8° 04'N; Long 77° 05'E), Station A₂ (Chinna Muttam: Lat 8° 05'N; Long 77° 06'E), Station A₃ (Arockiapuram: Lat 8° 05'N; Long 77° 11'E) and Station A₄ (Vattakottai: Lat 8° 06'N; Long 77° 15'E). Variation in the water temperature of marine water in the selected stations was studied from January 2007 to December 2010 by collecting water samples 1m depth from 6 to 8a.m. For the sake of convenience and easy interpretation, the calendar year was divided into four seasons viz. post-monsoon (January to February), summer (March to June), pre-monsoon (July to September) and monsoon (October to December) seasons. Water temperature was measured in the field itself using standard mercury filled centigrade thermometer method⁶.

RESULTS AND DISCUSSION

Water temperature recorded from all the four stations of Kanyakumari region has been given in Fig-1 and Table-1. The water temperature ranged from 24.32°C (Vattakottai) to 29.36°C (Kanyakumari). A uniform pattern of changes in temperature has been observed in relation to annual seasonal cycle (post-monsoon, summer, pre-monsoon and monsoon) in all the four stations. The post-monsoon season with minimum temperature and the summer season with maximum temperature were observed in all the stations. The maximum temperature during summer season gradually decreases in pre-monsoon and monsoon seasons and ultimately reaches the minimum temperature during post-monsoon season (Fig.1).

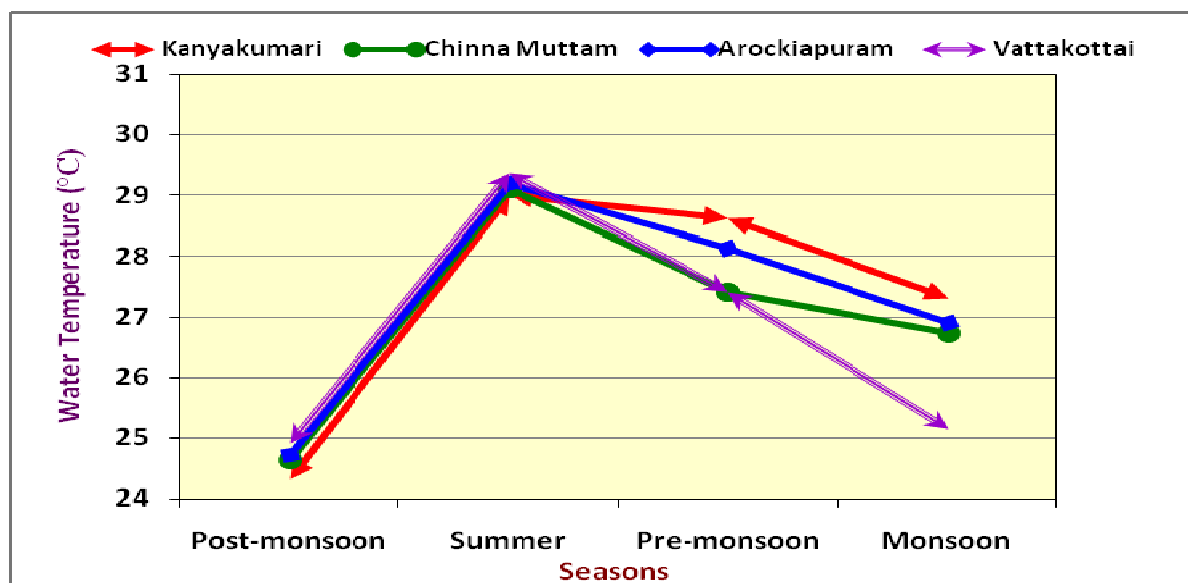


Fig.-1 Seasonal variation in water temperature of marine water (stations A₁-A₄)

Although the change in temperature is in uniform pattern in all the stations of the region, there is slight variation in temperature among the different stations. Among the region studied, the highest temperature (29.36°C) was observed in Vattakottai (A1) and the lowest temperature (24.32°C) was noted in Kanyakumari (A4). When the average temperature for each stations both in post-monsoon and summer is considered, there is a gradual increase in water temperature from southern most station to northern most station. Thus the average temperature during post-monsoon season in region A1, A2, A3 and A4 is 24.32°C, 24.64°C, 24.73°C and 24.92°C respectively. The average water temperature during summer in the stations A1, A2, A3 and A4 is 29.01°C, 29.11°C, 29.21°C and 29.36°C respectively. The minimum temperature (both during summer and post-monsoon) has been observed in Kanyakumari which is little away from the equator when compare to Vattakottai. The maximum temperature (both during summer and post-monsoon) has been noted in Vattakottai which is little close to the equator when compare to Kanyakumari station (Table-1).

Table-1: Seasonal variation in water temperature of marine water (stations A₁-A₄)

Stations		Seasonal variation in water temperature (°C)			
Number	Name	Post-monsoon	Summer	Pre-monsoon	Monsoon
A ₁	Kanyakumari	24.32±1.25	29.01±1.38	28.62±1.25	27.31±1.26
A ₂	Chinna Muttam	24.64±1.25	29.11±1.26	27.41±1.13	26.73±1.85
A ₃	Arockiapuram	24.73±1.58	29.21±1.95	28.13±1.36	26.91±1.79
A ₄	Vattakottai	24.92±1.51	29.36±1.72	27.41±1.52	25.14±1.49

From the observations it was noted that the water temperature showed seasonal variation throughout the year and the high water temperature was recorded during summer and low during post-monsoon in all the stations of Kanyakumari region in the south east coast of Tamil Nadu. It was followed by declining water temperature in the subsequent pre-monsoon and monsoon seasons. Each and every station showed the different water temperature in the south east coast of Tamil Nadu.

Water temperature is considered as one of the most important environmental factors which control all the biogeochemical reactions of the aquatic system. There are often variation in water temperature mainly due to seasonal changes and rainfall⁷. Due to the solar radiation and clean sky prevalent during the summer season, therefore water temperature was high in this season. This was reported by various authors from Kodikkarai^{8,9}, Tuticorin¹⁰, Trichendur¹¹ and Trichendur and Idinthakarai coasts¹². Lower temperature during the post-monsoon season in the months of January and February was due to cloudy sky and rainfall brought down the temperature to the minimum¹³. Similar observations have been reported Vellar estuary^{13,14,15}, Pichavaram mangroves water^{16,17,18,19}, Arasalar and Kaveri estuarine complex²⁰ and Palk Bay²¹. The water temperature variation may regulate the physico-chemical characteristics of water and also influenced the distribution, frequency, density and abundance of marine organisms in the coastal environment²².

REFERENCES

1. P.Anbazhagan, Hydrobiology and benthic ecology of Kodikkarai coastal sanctuary (South-east coast of India). Ph.D., Thesis, Annamalai University. 1988.
2. Anon. A report on the seaweed resources of Tuticorin-Trichendur coast, Tamil Nadu. *CMFRI and CSMCRI, Spl. Publ.*, 1989, 19.
3. S.B.Choudhury, R.C. Panigrahy. Seasonal distribution and behavior of nutrients in the Greek and coastal waters of Gopalpur, East coast of India: Mahasagar- *Bull. Nati. Inst., Oeanogr.*, 1991, **24** (2): 91-88.

4. N.Gothandaraman, Studies on micro Zooplankton, Ph.D.Thesis, Annamalai University, India, 1993, 180.
5. C.Kaliaperumal, Studies on the interrelationship between phytoplankton and zooplankton in the waterways of the Pitchavaram Mangroves (India). Ph.D. Thesis. Annamalai University, India. 1992, 215.
6. John Peter Paul, J. Studies on Seaweed resources and ecology of southern coastal region of Tamil Nadu. Ph.D., thesis submitted to Manonmaniam Sundaranar University, Tirunelveli. 2012, 35-36.
7. R.Kannan, L. Kannan, Physico-Chemical characteristics of seaweed beds of the Palk Bay, Southeast coast of India. *Indian J. Mar. Sci.*, 1996, **25**:358-362.
8. A.A.Karande, Use of epifaunal communities in pollution monitoring. *J. Environ. Biol.*, 1991, 191-200.
9. P.K.Karuppasamy, Studies on Zooplankton in the Pitchavaram Mangroves and laboratory culture of rotifer *Brachionus plicatilis*. M.Phil. Thesis, Annamalai University, India. 1997, 85.
10. D.S.Lal, *Oceanography*. Sharda Pustak Bhavan, Allahabad. 2005, 288.
11. P.Mani, Phytoplankton ecology of mangrove ecosystem. Ph.D., Thesis, Annamalai University, India. 1989, 72.
12. M.E.Rajapandian, C.P. Gopinathan, J.X. Rodrigo, A.D. Gandhi. Environmental characteristics of edible oyster beds in and around Tuticorin. *J. Marine Biol. Assoc. India*, 1990, **32**(1&2):90-96.
13. A.Santhosh, V. Sobha, J.T. Chandra, Hydrological parameters of Paravur canal with special reference to various environmental problems. *Indian Hydrobiology*, 2006, **9**(2):213-219.
14. R.Saraswathi, Hydrobiology of two estuarine systems (Arasalar and Kaveri) of the southeast coast of India with special reference to plankton. Ph.D. Thesis, Annamalai University. India. 1993, 267.
15. R.Seenivasan, Spectral reflectance properties of the Vellar estuarine environment, southeast coast of India, M.Phil. Thesis, Annamalai University. India. 1998, 35.
16. R.Selvaraj, R. Selvaraj, Distribution, Diversity of Seaweeds in Trichendur and Idinthakarai. *Seaweed Res. Utiln.*, 1997, **19**(1&2):115-123.
17. M.Sondergaard, K.S. Jensen, Physico-chemical environment, phytoplankton biomass and production in oligotrophic soft water lake Kalgaard, Denmark. *Hydrobiology*, 1979, **63**:241-253.
18. C.N.Spenser, D.L. King, Role of light, carbon dioxide and nitrogen in regulation of buoyancy, growth and bloom formation of *Anabaena flos-aquae*. *J. Plankos Res.*, 1989, **11**(2):283-296.
19. T.Takahiro, F. Yoshiko, Studies on morphological changes of blue green alga *Nostoc muscorum* with special reference to role of light. *Plant and Cell Physiol.*, 1981, **22**(2):185-195.
20. G.S.Thangaraj, Ecobiology of the marine zone of the velar estuary. Ph.D., Thesis, Annamalai University, India, 1985, 194.
21. G.S.Thangaraj, V. Sivakumar, R. Chandran, R. Santhanam, B. Srikrishnadhas, K. Ramamurthy. An environmental inventory of Porto-Novo coastal zone. *Proc. Symp. Environ. Biol.*, 1979, 75-87.
22. K.Vasanth, Studies on hydrobiology and decomposition of macrophytes in Portonovo marine environment (Southeast coast of India). Ph.D. Thesis, Annamalai University, India, 1989, 252.

CORRESPONDING AUTHOR: JOHN PETER PAUL J.; Department of plant Biology
and plant biotechnology, St. Xavier's college (autonomous), palayamkottai – 620 002,
Tamilnadu, India.