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Diurnal Water Quality Parameters of Southeast Coastline of Gulf of Mannar at Thoothukudi District, Tamil Nadu, India

A. Muthuraman[1]
Ph.D., Zoology Research Scholar,
Reg.No.11651
V.O.Chidambaram College, Thoothukudi.
Affiliation of Manonmaniam Sundaranar University,
Tirunelveli, Tamil Nadu, India.

K. Ganesh[2]
Ph.D., Zoology Research Scholar,
Reg.No.18112232191021.
V.O.Chidambaram College, Thoothukudi.
Affiliation of Manonmaniam Sundaranar University,
Tirunelveli, Tamil Nadu, India.

Dr. B. Geetha[3]
Associate Professor,
Department of Zoology,
V.O.Chidambaram College, Thoothukudi.
Affiliation of Manonmaniam Sundaranar University,
Tirunelveli, Tamil Nadu, India.

***Abstract*:- The coastline of Tamilnadu has a total length of about 1076 kms constitutes of 15% total coastal area length of India then stretches along the Arabian Sea, Indian Ocean and Bay of Bengal. It is a Third longest coastline in the India after Gujarat and Andhra Pradesh state. A study describes the diurnal parameters for water quality monitoring of Gulf of Mannar. The water quality parameters were carried out in two different coastal ecosystems Threspuram and Kayalpatnam fishing area for the period from the month of June 2018 to June 2019. The various physicochemical parameters like marine water temperature, salinity, pH and dissolved oxygen of the two different environments are the main factors to influence the water quality of the selected study sites. The analysis of physico-chemical parameters in the present study has achieved some important findings. The water temperature varied from 26.35 to 33.62°C, salinity ranged between 36.57 to 41.12 ppt, pH measured as from 6.89 to 7.21 and dissolved oxygen varied from 3.49 to 7.10 mg/l respectively. The physicochemical qualities of sea water are very important for the health biodiversity in total Gulf of Mannar. The obtained results are pronounced variation in most of the water quality parameters with geographical location.**

Keywords: Water Quality, Salinity, Light, Dissolved Oxygen, Temperature, pH

INTRODUCTION:

The coastal area of Tamil Nadu has vital 3 major ports, 7 Government ports and 16 non major ports and so many fishing harbors and a variety of coastal industries like sea foods company and thermal power plants. The marine biodiversity of Tamil Nadu is prosperous and such different. The coastline environment almost all types of intertidal zone habitats from high saline and estuaries, brackishwater lagoons, and coastal marsh, rocky and sandy shores. The Gulf of Mannar Marine National Park is a protected area of our country consisting of twenty one small islands and coral reefs in the Gulf of Mannar in the Indian sea. It lies 1 to 10 km away from the soustheast coastal of Tamil Nadu for 160 km between Thoothukudi and Dhanushkodi. The Gulf of Mannar is a large shallow bay is part of the Laccadive Sea in the India. It lies between the west coast of Sri Lanka and the southeastern tip of India in the Coromandel Coastal region. The Gulf of Mannar region supports a different type of habitats within the main ecosystems of coral reefs sea grass beds and coastal lagoons. Physical parameters such as salinity, light, temperature, dissolved oxygen and pH play an important regulating factor of water bodies. Chemical parameters involve such as pH and dissolved oxygen. It is high productivity of the area and important fishing ground both for India and Sri Lanka. Researchers observed a pattern of bleaching in corals reef when the temperatures rose to between 33 °C and 37 °C. Water quality test is an important role of environmental monitoring. When water quality is poor, it not only affects aquatic animal life but the surrounding ecosystem as well. This properties can be physical, chemical and biological factors. Chemical characters involve the parameters such as pH and dissolved oxygen. Physical properties of water quality such as turbidity and temperature. Biological indicators of water quality include phytoplankton, zooplankton and algae. These parameters are related not only surface water studies of the ocean but to groundwater and industrial processes as well. Salinity is the concentration of all dissolved salts in water. It is strong contributor to conductivity. Electrolytes form the ionic particles as dissolve each with a positive and negative charge. While salinity can be measured by chemical analysis, this method is some difficult and time consuming. Water temperature an expressing physical property how hot or cold water is. Both arbitrary terms temperature can further defined as a measurement of the average thermal energy of a substance. The solubility of oxygen will decrease as temperature increases.

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REVIEW OF LITERATURE:

The Tamil Nadu government on 1986 declared the 21 islands as Marine National Park for the purpose of protecting marine wildlife fishes. The Gulf of Mannar Biosphere Reserve was start in 1989 by Government of India covering 10,500 sq.km area between Ramanathapuram and Kanyaakumari. Bhatia and Kumar (1979) and Hussain (2000) and Mohan (2001); Hussain et al. Jain (1978, 1981). The Gulf of Mannar is vital and large biodiversity of ecosystems like coral reefs, mangrove forests, rocky shores, sandy beaches, mud flats, estuaries, seaweeds and seagrass beds. It was once considered as "Biologist's paradise" for its gorgeous biological treasure with over 4300 species of flora and fauna. Recent marine water bodies of Indian coast are studied by Baskar et al. (2013), Khosla et al. (1982), Sridhar et al. (1998, 2011); Varma et al. (1993). The rainfall and fresh water in flow from land in turn moderately reduced the salinity, Ganesh,K. Dr.B.Geetha and J.Shoba et al., (2018); Mitra et al., (1990); Ganesh,K. and Dr.B.Geetha. et.al., (2017). Mohanthy et al. (2010). Seasonal and the spatial variations of physic-chemical parameters was correlated with population of living organisms by Varshney et al. (1983); Nazerath Nisha, Ganesh,K. and Dr.B.Geetha (2018); Prasannakumar et al. (2000); pH of seven the hydrogen and hydroxyl ions have equal concentrations, 1x10-7 M, keeping the solution neutral 27. Murugesan,V. Ganesh,K. and B.Geetha. et al. (2019); Muthuraman, A. Ganesh,K. and B.Geetha. et al., (2019). Other possible method of nitrates entry through oxidation of ammonia form of the nitrogen to nitrite formation (Rajasegar, 2003). This means that colder lakes and streams can hold more dissolved oxygen than warm waters. Studies pertaining to source, distribution and utilization of inorganic compounds were reported by Ranjiga Anjali,A. and Ganesh,K. and Dr.B.Geetha et al. (2018), If water is too warm it cannot hold enough oxygen for marine animals to survive. pH is calculated by the number of hydrogen ions in the solution.

MATERIALS AND METHODS:

Study Area:

Thoothukudi district is located at 8.53°N 78.36°E in South India on the Gulf of Mannar. Sea water sample around Threspuram fishing centre and Kayalpatnam fishing centre are near in Thoothukudi coastline area were collected every fortnight from June 2018 to June 2019 during spring tide. Samples collected in the separates polythene bottles for planktons, chlorophyll- a, nutrients and in glass stopper bottles for the estimation of dissolved oxygen and BOD. It is stored at 5˚C for the physicochemical analysis. Temperature and P^H were measured using digital thermometer and p^H meter respectively.

RESULTS:

The physic-chemical parameters survey is also attention on the impact of marine climatic conditions on the ground water in Gulf of Mannar coastal aquifers. These sea water temperatures of the Threspuram were varied from 26.12°C to 27.21°C (Table:1.). Similarly Kayalpatnam were varied from 24.75°C to 25.32°C. Water temperature variation is affecting the ability of water hold oxygen and minerals in water. The acidic and alkaline (P^H) of the Threspuram were varied from 7.85 to 8.12 and Kayalpatnam varied from 6.78 to 7.45 at two sampling area of Gulf of Mannar. The city drain waste water mixing in Threspuram coastline water so some factors is affected water quality. High pH values were recorded Threspuram fish landing area. Salinity is a key factor in the living organisms and variation by evaporation and dilution water and planktons. Salinity of the Threspuram 28.34 to 29.62 and Kayalpatnam 6.78 to 7.45 respectively. The Nitrite values were observed in the range from 0.25 µ mol/L to 0.75 µ mol/L at Threspuram and 0.14 µ mol/L to 0.56 µ mol/L at Kayapattinam. The Nitrate values were observed in the range from 0.41 µ mol/L to 1.84 µ mol/L at Threspuram and 0.32 µ mol/L to 1.12 µ mol/L at Kayapattinam. Ammonia is several forms of nitrogen and very important in living aquatic animals. The ammonia values were observed in the range from 1.14 µ mol/L to 6.22 µ mol/L at Threspuram and 1.45 µ mol/L to 5.78 µ mol/L at Kayalpatnam (Fig.1). The oxygen can be dissolving in water is function of temperature and dissolved oxygen content in water varying from area to area and time to time. The dissolved oxygen is very important for survival of aquatic animal life. Dissolved oxygen of the samples were varied from 3.45 mg/L to 5.72 mg/L. Similarly Kayalpatnam were varied from 2.14 mg/L to 4.21 mg/L (Fig.2). The Biological Oxygen Demand (BOD) is also important for presence of organic materials in water for supporting aquatic life. The BOD depends on dissolved oxygen and organic matters. The BOD values were observed in the range from 2.12 mg/L to 8.54 mg/L at Threspuram and 1.78 mg/L to 7.32 mg/L at Kayalpatnam. The main use of Nitrate processes to nitrification in the water. The Total Nitrogen (µ mol/L) were observed in the range from 8.85 µ mol/L - 28.24 µ mol/L at Threspuram and 7.26 µ mol/L - 27.42 µ mol/L at Kayalpatnam. The Total Phosphorus (µ mol/L) were observed in the range from 0.54 µ mol/L - 1.83µ mol/L at Threspuram and 0.240.24 - 1.38µ mol/L at Kayalpatnam.

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Table: 1. Water Quality Parameters in Study Area.

Water Quality Parameter	Threspuram		Kayalpatnam	
	Range	Mean± SD	Range	Mean± SD
Temperature (^{o} C)	26.12 - 27.21	27.12±0.34	24.75 - 25.32	25.54±0.4
p^{H}	7.85 - 8.12	7.14±0.11	6.78 - 7.45	7.14±0.11
Salinity (ppt)	28.34 - 29.62	28.49 ±0.17	27.44 - 28.41	28.49±0.17
Nitrite (µ mol/L)	0.25 - 0.75	0.27 ± 0.45	0.14 - 0.56	0.27±0.45
Nitrate (µ mol/L)	0.41 - 1.84	1.03 ± 0.41	0.32 - 1.12	1.03±0.41
Ammonia (µ mol/L)	1.14 - 6.22	3.89 ± 1.64	1.45 - 5.78	3.89±1.64
DO (mg/L)	3.45 - 5.72	4.54 ± 0.74	2.14 - 4.21	4.54±0.74
BOD (mg/L)	2.12 - 8.54	2.07 ± 2.31	1.78 - 7.32	2.07±2.31
Total Nitrogen (µ mol/L)	8.85 - 28.24	18.21±5.12	7.26 - 27.42	18.21±5.12
Total Phosphorus (µ mol/L)	0.54 - 1.83	1.12 ± 0.45	0.24 - 1.38	1.12±0.45

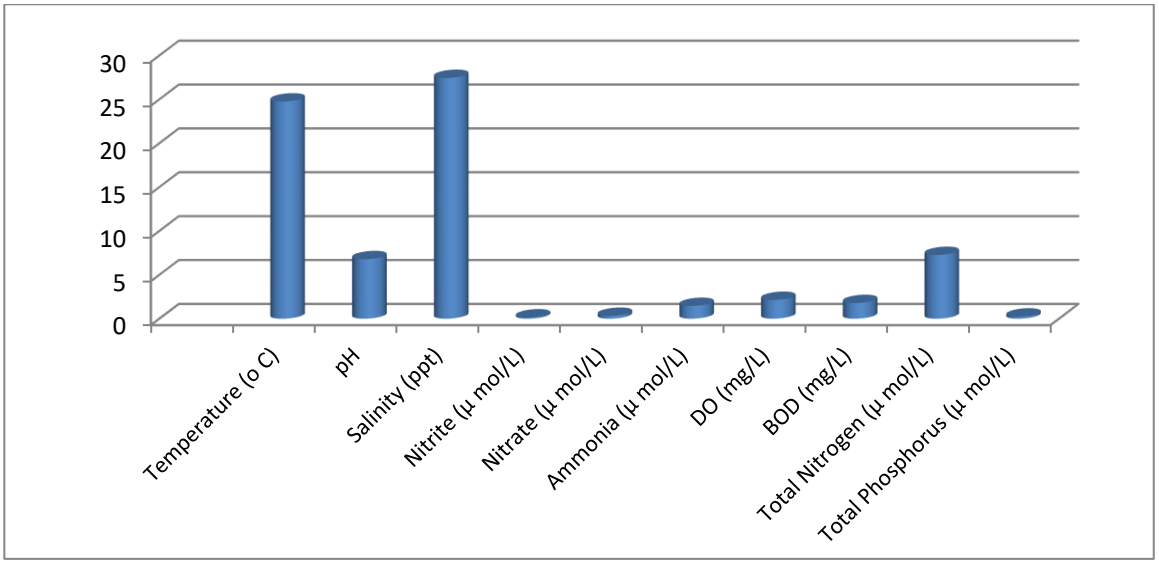

Fig.1. Threspuram Fish Landing Center

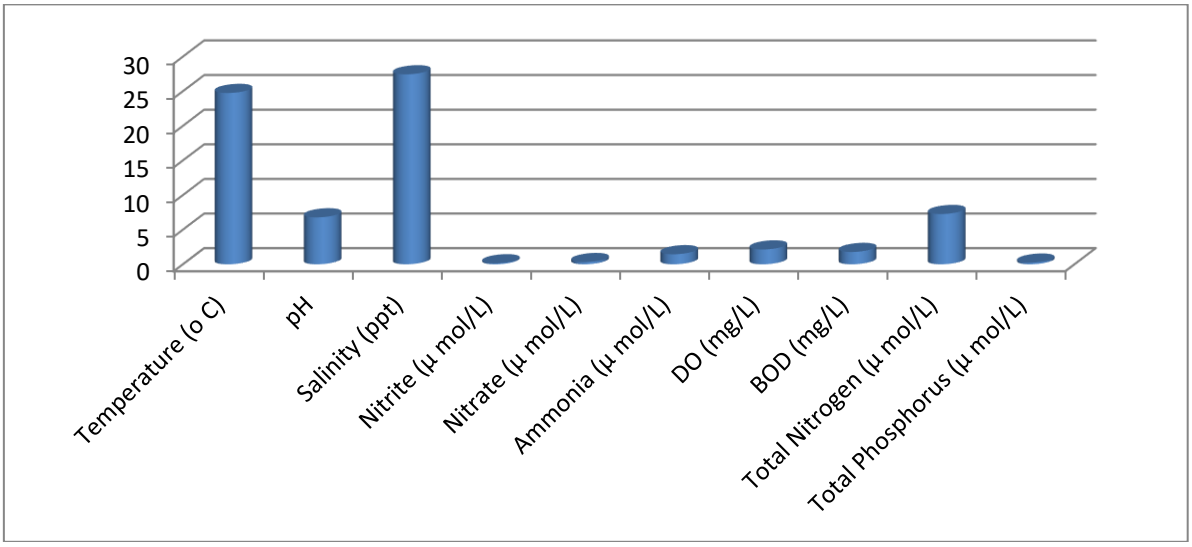

Fig.2. Kayalpatnam Fish Landing Center

CONCLUSION:

The water quality of coastline around Threspuram fishing centre and Kayalpatnam fishing centre show the maximum nutrients enrichment during this study period. The major anthropogenic impacts on the coastline waters of the study area are due to the intensification of fishing and waste water urbanization by discharging sewage from hotels and houses directly into the marine. At Threspuram is high BOD with low DO is observed during summer due to the fishing and boat motors oil merge sea water in high for the domestic pollution. Discharges lead to degradation of sea water quality causing significant negative impacts on marine ecosystem and aquatic animals and coral reefs. High salinity and high DO are observed during monsoon in

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Threspuram and during post monsoon at Kayalpatnam respectively. The small amount of concentration of nutrients, salinity and temperature are found during post monsoon period.

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