E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2017; 5(2): 328-331

www.fisheriesjournal.com
Received: 15-01-2017
Accepted: 16-02-2017

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Physicochemical parameters in Karwar coastal water, central West coast of India

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Abstract
In present study an attempt was made to investigate the bottom water physicochemical characteristics of coastal inshore water at nine stations along the coast of Karwar, India. Bottom water temperatures varied from (24.0 °C to 33.0 °C.). Salinity values varied from (8ppt. to 36ppt.), and pH ranged from (7.0 to 8.35.), Variation in dissolved oxygen content was from (2.2 mg/l to 4.36 mg/l), the range of inorganic nutrients viz. nitrites, nitrates, phosphates and silicates were (0.99 µg/l to 2.69 µg/l), (0.3µg/l to (2.95µg/l), (0.35µg/lto2.88µg/l), (5.35µg/l to 256.45µg/l) respectively.

Keywords: Bottom water, temperature, salinity, pH, dissolved oxygen, physicochemical, nutrients

1. Introduction
The marine environment, as a complex system is mainly influenced by various Physical, chemical and biological processes. The hydrological study is a prerequisite in any aquatic system. To study the environmental condition and distribution of aquatic organisms. In the physical and chemical parameters of the water. In recent years, due to anthropogenic activities, industrial effluents, domestic wastages seriously affect on aquatic system may result in decreased species abundance, diversity and change the biology of the species. Present study therefore, has been aimed to study hydrological parameters of nine inshore bottom waters stations along the coast of Karwar for a period of thirteen months from March 2015 to March 2016.

2. Materials and Methods
2.1 Study Area
The present study was carried out along the coast of Karwar, India. Lying within (14^0 48' 02" to 14^0 50' 32" N and 74^0 03'12" to 74^0 07'30" E). The Karwar coast, on the central west coast of India (Fig.1) The coast line in this division is rugged. Karwar bay is one of the many sheltered coastal waters. In present study nine sampling sites were chosen at the depth varied from 2 to 10 mtrs, 15mtrs.
Temperature was measured using standard centigrade thermometer. Salinity was estimated with the help of a refractometer and pH was measured using digital pH meter. Dissolved oxygen was estimated by the standard method and is expressed as mg/l. For the analysis of nutrients, bottom water samples were immediately collected by Casella bottle, transferred into separate bottles and transported to the laboratory. The water samples were analysed for dissolved inorganic nitrates, nitrites, phosphates, silicates by Spectrophotometer and expressed in µg/l.

2.2 The nine inshore bottom water study sites as follows
1. Majali 2. Devbag 3.Kurmgad 4. Devgad 5.Baithkhol bay 6.Binga 7. Baithkhol port (front)) 8.Baithkhol port (back) 9.Baithkhol port (side)

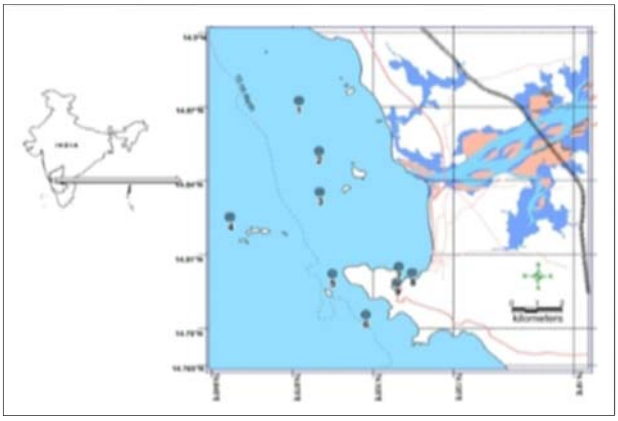
3. Results
Monthly variations in physicochemical parameters viz. bottom water temperature, salinity, pH, dissolved oxygen, nitrates, nitrites, phosphates and silicates in waters were recorded early in the morning.

3.1 Temperature

During the study period the bottom water temperature varied from (24.0 °C to 33.0 °C). Bottom temperatures were recorded as minimum in winter season (November, 2015) at station 7 and maximum during summer season (May, 2015) at station 2. In general, all the nine stations showed similar seasonal changes (Fig.1).

3.2 Salinity, pH and Dissolved Oxygen

Among the nine stations, the bottom water salinity varied from (8ppt. to 36ppt.) during the entire study period, recorded maximum in May and minimum during July (Fig.2). pH of the bottom water followed trend similar to that of salinity (Fig.3). It ranged from (7.0 to 8.35) Dissolved oxygen of the bottom water varied from (2.2 mg/l to 4.36 mg/l) (Fig.4). The maximum value recorded in the month of January and minimum during winter season (November, 2015).Better oxygenated conditions prevailed in all the stations. Nitrites (NO_2), Nitrates, (NO_3) Phosphates and Silicates. Nitrite The bottom water nitrite concentration varied from (0.99 µg/l to 2.69 µg/l) in the entire study period. The maximum nitrite value was recorded in December at station7 and minimum was recorded in March at station 6 (Fig.5). Nitrate in bottom water sample varied from minimum, at station 6 (April, 2015) minimum (2.95µg/l) (June, 2015) at station1. (Fig.6) Inorganic phosphate concentration in the bottom water varied from 0.35µg/l to 2.88µg/l. The maximum phosphate concentration was recorded in July in station 2 and minimum phosphate values in July at station 6. (Fig.7). The bottom water Silicates varied between (5.35µg/l to 256.45µg/l). Minimum at station 6 in May and maximum in June at station 1. (Fig. 8).



Map 1: Showing the location of the inshore water study area in Karwar Coast.

3.3 Graphical representation of physicochemical parameters of nine study sites of Karwar Coast.

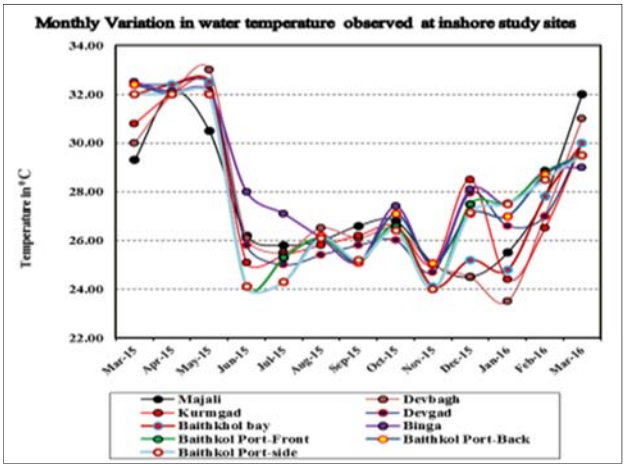


Fig 1: Monthly variation in bottom water temperature during March 2015–March 2016

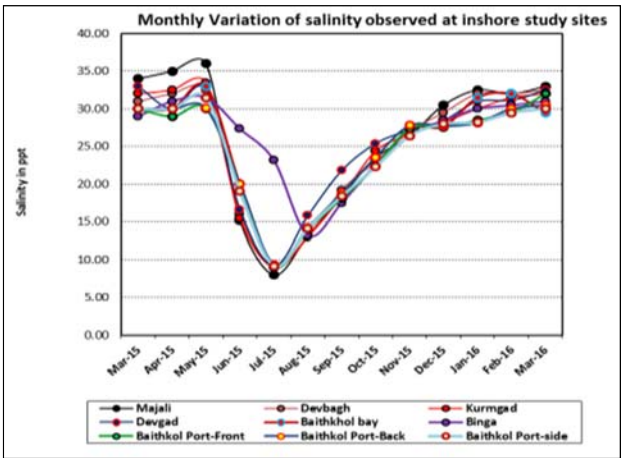


Fig 2: Monthly variation in bottom water salinity during March 2015–March 2016 at nine stations

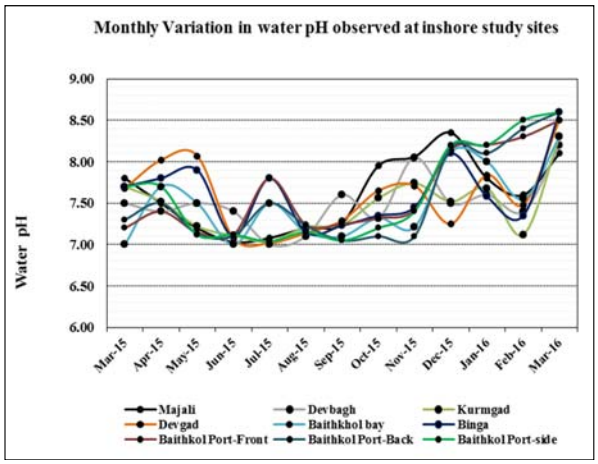


Fig 3: Monthly variation in bottom water pH during March 2015–March 2016 at nine stations

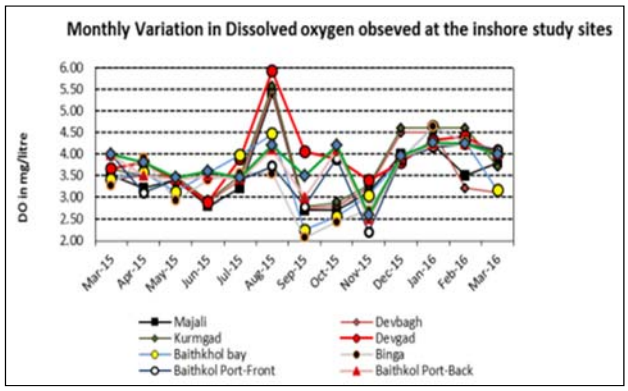


Fig 4: Monthly variation in bottom water D.O.during March 2015–March 2016 at nine stations

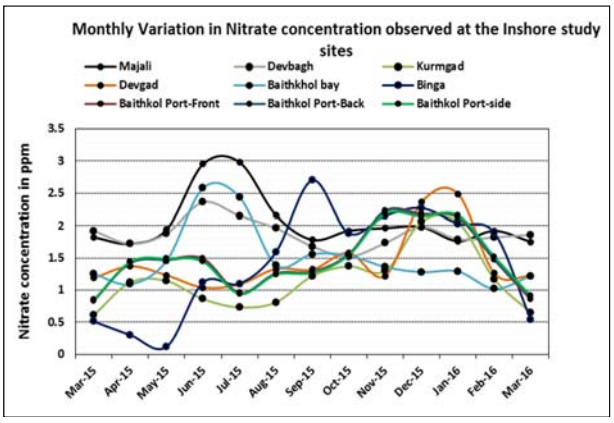


Fig 6: Monthly variation in bottom water NO_3 during March 2015–March 2016 at nine stations

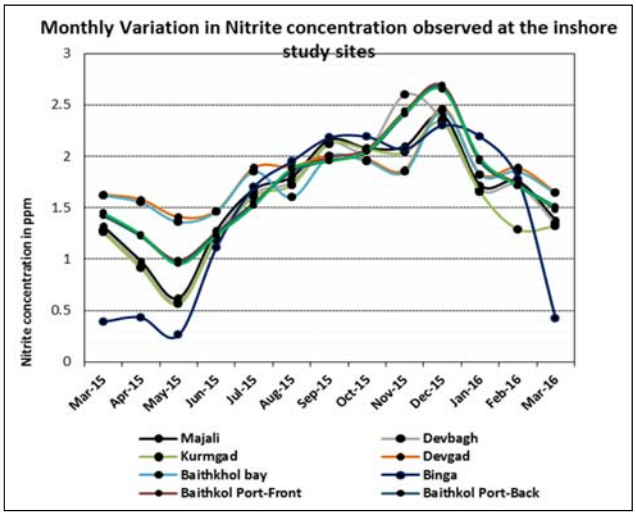


Fig 5: Monthly variation in bottom water NO_2 during March 2015–March 2016 at nine stations

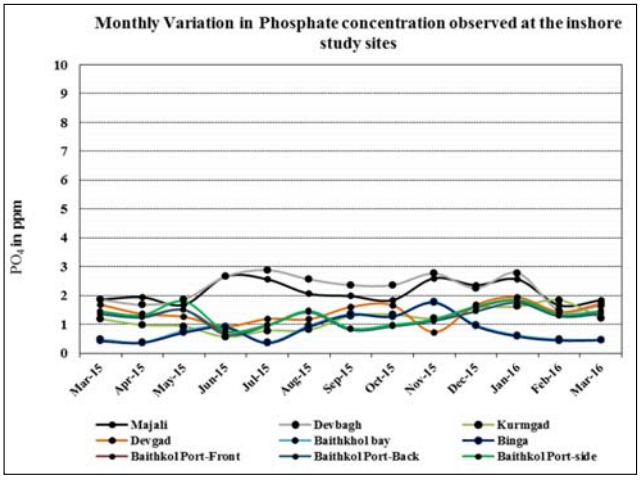


Fig 7: Monthly variation in bottom water PO_4 during March 2015–March 2016 at nine stations

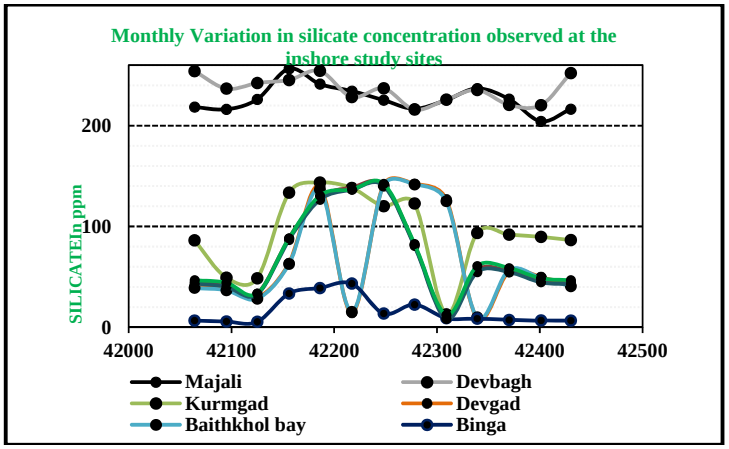


Fig 8: Monthly variation in bottom water Silicate during March 2015–March 2016 at nine stations

4. Discussion

Temperature is a primary abiotic factor controlling key physiological, biochemical and life history processes of aquatic life [13] From the results of the present study it is observed that the bottom water temperature is low. Seasonal variations were observed in bottom water temperature and all nine stations showed similar pattern. The bottom water temperature showed an increasing trend from January till June From July onwards decline in temperature is observed till December. There is no much variation in bottom water temperature between the stations. Salinity acts as a limiting factor in the distribution of living organisms. Monthly variations of salinity followed a typical pattern of high during summer due to prevailing northerly current and reduction in the fresh water influx. The steady high salinity from March till July could be attributed to the upwelling of water [14] Hydrogen ion concentration (pH) gets changed with time due to changes in temperature, salinity and biological activity.

High pH in summer is due to the influence of high biological activity and the influence of sea water penetration. Dissolved oxygen are vital to aquatic life and is needed to keep organism alive. It is most significant parameter affecting the productivity of aquatic system Dissolved oxygen was higher during January and lower during November. From the present investigation it is apparent that oxygen concentration was influenced by temperature, salinity in association with physical and biological process in the coastal environment. Higher values were recorded in January when temperature and salinity were relatively low. Low values during April and May are due to upwelling. There is decrease in dissolved oxygen in June and July due south-west monsoons.

Nitrites, nitrates, phosphates, silicates nutrients are considered as one of the most important parameters in the coastal environment influencing growth, reproduction and metabolic activities of living beings [15] Bottom features of the Karwar bay [6] while investigating the benthic ecology of Karwar bay observed that the depth varied from· 2 to 15' metres. Temperature and salinity of bottom waters attained highest values during March and May, being similar to the findings of Noble (1968) in these waters. The mean salinity observed was between (20.36ppt. to 23.57ppt.) Temperature showed the mean lowest of 26.92 °C in station 2 of Karwar bay better oxygenated conditions prevailed in all the stations, the range being 1.635 to 3.237 ml/l. The enormous supply of suspended load of SW monsoon by Kali estuary was found to be responsible for the decline in dissolved oxygen values.

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