ANALYSIS OF PHYSICO–CHEMICAL PARAMETERS IN KUDUVAIYR ESTUARY, NAGAPATTINUM EAST COAST, TAMIL NADU INDIA.

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ABSTRACT

Water is one of the most common and the large precious resources on world. ground water resources have been contaminated by organic, inorganic and biological pollution. Therefore management of aquatic ecosystem in particular has become a main concern in present years. Estuaries constitute a major Interface between land and the ocean and have been regarded as one of the most important aquatic system. Surface water samples were collected from Kuduvaiyr estuary are during period of 2014 to 2015. The physicochemical parameters such as rain fall, pH, atmospheric and surface temperature, Dissolved oxygen and salinity’s were assessed different seasons (Pre- Monsoon, Monsoon, Pos- Monsoon and Summer). The physico–chemical changes may have the tendency to accumulate in the various organs of estuarine organisms, especially fish which may in turn enter into the human metabolism through consumption causing serious hazards.

Keyword: Kuduvaiyr estuary, Dissolved Oxygen, Temperature,
INTRODUCTON

Water is one of the most common and the large precious resources on world, without which there would be no life on world, pollution is a serious problem as 70% of India’s surface water resources and ground water resources have been contaminated by organic, inorganic and biological pollution. Therefore management of aquatic ecosystem in particular has become a main concern in present years. Estuarine and coastal areas are complex and dynamic aquatic environment (Morris et al., 1995). Estuaries constitute a major Interface between land and the ocean and have been regarded as one of the most important aquatic system. The progressing of large buildings (Municipal - waste) In Nagapattinum has become a threat to the health of the Kuduvaiyr Estuarine and coastal water environment. The sewage from urban area and industrial wastages contributes a constant source of pollutants, whereas the surface runoff is a seasonal phenomenon largely affects by climate in the basin. The urban inputs, agricultural runoff and industrial inputs play a vital role in nutrient cycling, water quality eutrophication, biota abundance and overall food web dynamics in Estuaries and near shorce ecosystems, aport from this fishing activities near the estuary also influence the water quality parameters (Blaber et al., 2000) nutrient enters into coastal seas through various modes viz, terrestrial runoff, estuary, effluent discharge etc. the quick alternation in nutrient structure effects the phytoplankton taxonomic composition and in order leads to the eutrophication and algal blooms (Bethoux et al., 2002; Piehler et al., 2004). The water quality defends on both natural processes, such as precipitation erosion, weathering of crystal materials and anthropogenic processes like urbanization, Industrialization, Mining and agricultural activities (Chakrapani et al., 1993). In the present study, physicochemical parameters such as rain fall, pH, atmospheric and surface temperature, Dissolved oxygen and salinitys were assessed in Kuduvaiyr estuary, Nagapattinum east coast, Tamil Nadu, India.

MATERIALS AND METHODS

Study area

The water sample was collected from Kuduvaiyr estuary, Nagapattinum east coast, Nagapattinum district, Tamil Nadu India.
Sample Collection

The sampling has been taken in pre cleaned polyethylene bottles. Plastic bottles of 2 liter capacity were used to collect the samples. The water samples were collected from different seasons (Pre- Monsoon, Monsoon, Pos- Monsoon and Summer) in the year of 2014 - 2015.

Physicochemical analysis

Water and air temperatures were measured using standard mercury filled centigrade thermometer. pH of the water samples were determined by portable pen type electronic pH meter. The pH meter was immersed in the water and pH values were read directly from the digital screen. The Mohr-Knudsen titration procedure and Winkler’s method was followed for salinity (Strickland and Parsons, 1972). The Dissolved oxygen was estimating Winkler’s Method (Strickland and Parsons, 1972).

RESULTS

Table 1 shows the Seasonal and annual mean of Physico-chemical Parameters in Kuduvaiyr estuary, Nagapattinum east coast. During the study period, the study area experienced a total rainfall of 986.1mm with a maximum in monsoon while of 4.40mm (November 2014) in summer followed by pre-monsoon (533mm) and pos- monsoon (52.80mm).

The low atmosphere temperature (30.54°C) was recorded during monsoon (November 2014) and high temperature (31.84°C) in summer (May 2015). Surface water temperature varied from 28.42°C (monsoon) to 30.52°C (summer) during the study period.

Salinity in the study area was low (29.30%) during monsoon whereas high (34.85%) during summer season of the study period. The present investigation showed minimum values of dissolved oxygen content (5.20ml/l) during summer and maximum (6.75ml/l) during monsoon seasons of study period. Hydrogen ion concentration (pH) was always towards the alkaline condition in the range of 8.02 to 8.43.
Table 1. Seasonal and annual mean of Physico-chemical Parameters in Kuduvaiyr estuary, Nagapattinum east coast.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Pre Monsoon</th>
<th>Monsoon</th>
<th>Post Monsoon</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall (Mm) 2014-15</td>
<td>533.00±37.31</td>
<td>986.10±69.02</td>
<td>52.80±3.69</td>
<td>4.40±0.30</td>
</tr>
<tr>
<td>Atmospheric Temperature (°C) 2014-15</td>
<td>31.40±2.19</td>
<td>30.50±2.13</td>
<td>31.00±2.17</td>
<td>31.84±2.22</td>
</tr>
<tr>
<td>Surface water Temperature (°C) 2014-15</td>
<td>28.42±1.98</td>
<td>28.30±1.98</td>
<td>29.70±2.07</td>
<td>30.50±2.13</td>
</tr>
<tr>
<td>Salinity(35°/oo) 2014-15</td>
<td>33.20±2.32</td>
<td>29.30±2.05</td>
<td>34.20±2.39</td>
<td>34.85±2.43</td>
</tr>
<tr>
<td>Dissolved O₂ (ml/l) 2014-15</td>
<td>5.42±0.37</td>
<td>6.75±0.47</td>
<td>5.50±0.38</td>
<td>5.20±0.36</td>
</tr>
<tr>
<td>pH 2014-15</td>
<td>8.10±0.56</td>
<td>8.20±0.57</td>
<td>8.02±0.56</td>
<td>8.43±0.59</td>
</tr>
</tbody>
</table>

Value expressed as Mean ± SD for triplicates.

Figure 1. Seasonal Changes in Rainfall during the study period

Figure 2. Seasonal Changes in Atmospheric Temperature during the study period
Figure 3. Seasonal Changes in Surface Temperature during the study period

Figure 4. Seasonal Changes in Salinity during the study period

Figure 5. Seasonal Changes in Dissolved oxygen during the study period

Figure 6. Seasonal Changes in pH during the study period
DISCUSSION

The seasonal variation in physico chemical parameters such as rainfall, air and surface water temperature, salinity, dissolved oxygen and pH contents in Kuduvaiyr estuarine waters were recorded for a period of 2014 to June 2015. The surface water temperature largely depends upon the intensity of solar radiation, evaporation, freshwater influx, cooling and mixing due to currents and tidal flow. Surface water temperature also showed a similar trend of monthly variation as that of air temperature and the low atmosphere temperature (30.54°C) was recorded during monsoon (November 2014) and high temperature (31.84°C) in summer (May 2015). The gradual increase in water temperature from post monsoon to summer is directly related to atmospheric conduction and radiation similar finding were reported by (Thangaraj, 1984). During the study period surface water temperature varied from 28.42°C (monsoon) to 30.52°C (summer) during the study period.

A marked seasonal change in salinity was observed throughout the study period. Salinity was low (29.30%) during monsoon whereas high (34.85%) during summer season of the present study. The salinity variation in the exchange of ions and nutrient is because of the tidal flow and low during the monsoon season in the Kuduvaiyr estuary. The present study in the conformity with the earlier reports from velar estuary (Palpandi, 2011; Singbal, 1976; Soundarapandian et al., 2009)

Dissolved oxygen is one of the most important parameters which reflects the physical and biological processes of water. The dissolved oxygen content depends upon the photosynthetic activities, monsoonal floods and the turbulence caused by winds (Nedumaran et al., 2012). In the present study, minimum values of dissolved oxygen content (5.20ml/l) during summer and maximum (6.75ml/l) during monsoon seasons. During study period, the dissolved oxygen concentration was low in monsoon compared to summer season which may perhaps to due to low rainfall recorded during the period. The trend noticed in the present study is in accordance with the findings of hydrology and heavy metals (Rajasegar, 2003).

The monthly mean values of hydrogen ion concentration of water varied form 7.5 to 8.5. Maximum values of pH were observed in 2014 - 2015. pH was always towards the alkaline condition in the range of 8.02 to 8.43. The minimum values of pH during the environmental changes in the study area may be controlled by the influence of freshwater discharge rainfall and
the decomposition of organic matter as started by (Ragothaman and Patil, 1995; Upadhyay, 1998). The photosynthetic activity may cause high pH, because of bicarbonate degradation by carbonic anhydrase associated with photosynthesis (Rajkumar et al., 2009).

CONCLUSION

The seasonal variation in physic-chemical parameters such as rainfall, air and surface water temperature, salinity, dissolved oxygen and pH were monitor in Kuduvaiyr estuarine. A total rainfall of 986.1mm with a maximum in monsoon while of 4.40mm (November 2014) in summer followed by pre-monsoon (533mm) and post-monsoon (52.80mm). The low atmosphere temperature (30.54°C) was recorded during monsoon (November 2014) and high temperature (31.84°C) in summer (May 2015). Surface water temperature varied from 28.42°C (monsoon) to 30.52°C (summer) during the study period. Salinity in the study area was low (29.30%) during monsoon whereas high (34.85%) during summer season of the study period. The minimum values of dissolved oxygen content (5.20ml/l) during summer and maximum (6.75ml/l) during monsoon seasons of study period. Hydrogen ion concentration (pH) was always towards the alkaline condition in the range of 8.02 to 8.43. The physico–chemical changes may have the tendency to accumulate in the various organs of estuarine organisms, especially fish which may in turn enter into the human metabolism through consumption causing serious hazards.

REFERENCES


