

## RESEARCH FINDINGS

The present study was conducted to assess the diversity of plankton species and biomass in seagrass and coral reef ecosystems of the Mandapam coastal waters in Gulf of Mannar. Three sampling stations were selected such as Chinnapalam (station 1 – coastal water with seagrass beds), Shingle Island (station 2 - coastal water with coral reefs) and Kundhukal (station 3 - coastal waters without seagrass and coral reefs as control station). The physico chemical and biological parameters were analysed for the period of 9 months from September 2016 to May 2017.

In the present study, the values of surface water temperature ranged from 25 to 30, 26 to 30 and 26 to 30°C at stations 1, 2 and 3 respectively.

The depth of the sampling stations varied from 0.50 to 0.67 m at station 1, 0.80 to 0.97 m at station 2 and 0.94 to 1.15 m at station 3.

The values of pH ranged from 7.69 to 8.23, 7.86 to 8.09 and 7.68 to 8.19 in stations 1, 2 and 3 respectively.

The values of salinity ranged from 32 to 36 ppt at station 1, 31 to 36 ppt at stations 2 and 3.

The values of dissolved oxygen ranged from 3.24 to 4.69 ml.l<sup>-1</sup> at station 1, 2.68 to 4.24 ml.l<sup>-1</sup> at station 2 and 3.13 to 4.69 ml.l<sup>-1</sup> at station 3.

The nitrite concentration in the three stations 1, 2 and 3 varied between 0.03 and 0.51, 0.02 and 0.55 and 0.08 and 0.63 µg.at.NO<sub>2</sub>-N. l<sup>-1</sup> respectively.

The nitrate concentration ranged from 0 to 0.03 µg.at.NO<sub>3</sub>-N.l<sup>-1</sup> at station 1, 0 to 0.05 µg.at.NO<sub>3</sub>-N.l<sup>-1</sup> at station 2 and 0 to 0.02 µg.at.NO<sub>3</sub>-N.l<sup>-1</sup> at station 3.

The phosphate concentration ranged from 0.11 to 0.90  $\mu\text{g.at.PO}_4\text{-P.l}^{-1}$  at station 1, 0.14 to 1.16  $\mu\text{g.at.PO}_4\text{-P.l}^{-1}$  at station 2 and 0.16 to 0.95  $\mu\text{g.at.PO}_4\text{-P.l}^{-1}$  at station 3.

The concentration of silicate ranged from 0.08 to 1.75  $\mu\text{g.at.Si.l}^{-1}$  at station 1, 0.30 to 1.98  $\mu\text{g.at.Si.l}^{-1}$  at station 2 and 0.50 to 1.36  $\mu\text{g.at.Si.l}^{-1}$  at station 3.

The concentration of ammonia varied from 0.01 to 0.17  $\mu\text{g.at.NH}_3\text{-N.l}^{-1}$  at station 1, 0 to 0.09  $\mu\text{g.at.NH}_3\text{-N.l}^{-1}$  at station 2 and 0.01 to 0.12  $\mu\text{g.at.NH}_3\text{-N.l}^{-1}$  at station 3.

The values of Biological Oxygen Demand ranged between 0.24 and 1.79, 0.34 and 3.12 and 0.22 and 1.34  $\text{ml.l}^{-1}$  at stations 1, 2 and 3.

The Chemical Oxygen Demand values ranged from 0.56 to 1.92  $\text{mg.l}^{-1}$  at station 1, 0.48 to 3.84  $\text{mg.l}^{-1}$  at station 2 and 0.32 to 2.40  $\text{mg.l}^{-1}$  at station 3.

The values of gross primary production of the three stations varied between 0.10 and 1.20  $\text{mgC.m}^{-3}.\text{h}^{-1}$  at station 1, 0.07 and 1  $\text{mgC.m}^{-3}.\text{h}^{-1}$  at station 2 and 0.10 and 0.60  $\text{mgC.m}^{-3}.\text{h}^{-1}$  at station 3.

The values of net primary production varied between 0.05 and 0.45  $\text{mgC.m}^{-3}.\text{h}^{-1}$  at station 1, 0.05 and 0.21  $\text{mgC.m}^{-3}.\text{h}^{-1}$  at station 2 and 0.05 and 0.40  $\text{mgC.m}^{-3}.\text{h}^{-1}$  at station 3.

The values of chlorophyll-a content varied from 0.01 to 2.11  $\text{mg.m}^{-3}$  at station 1, 0.01 to 1.76  $\text{mg.m}^{-3}$  at station 2 and 0.02 to 0.61  $\text{mg.m}^{-3}$  at station 3.

A total of 69 species of phytoplankton and 65 species of zooplankton were recorded from the all the three stations.

The total number of phytoplankton species distributed in three stations was 60, 46 and 62 respectively. The number of phytoplankton species distributed at any

one time of the study period ranged from 11 to 30, 10 to 18 and 12 to 29 at stations 1, 2 and 3 respectively.

The total number of zooplankton species distributed in three stations was 59, 49 and 59 respectively. The number of zooplankton species distributed at any one time of the study period ranged from 18 to 40, 16 to 23 and 19 and 36 at stations 1, 2 and 3 respectively.

The total phytoplankton density ranged from 89 to 1123 cells.l<sup>-1</sup> in station 1, 61 to 122 cells.l<sup>-1</sup> in station 2, and 70 and 1081 cells.l<sup>-1</sup> in station 3. *Oscillatoria* sp. observed to be very high during May 2017 with the density of 916 cells.l<sup>-1</sup> in station 1. The other dominant species recorded were *Nitzschia sigma*, *Ceratium macroceros* and *Biddulphia sinensis* in station 1, *Triceratium favus*, *Oscillatoria*, *Biddulphia pulchella*, *Pinnularia alpina* and *Pleurosigma elongatum* in station 2 and *Chaetoceros messanensis*, *Asterionella japonica*, *Ceratium macroceros*, *Chaetoceros dydymus*, *Oscillatoria* sp. and *Chaetoceros curvisetus* in station 3.

The total zooplankton density ranged from 126900 to 667400 nos. m<sup>-3</sup> in station 1, 108100 to 512300 nos. m<sup>-3</sup> in station 2 and 89300 to 935300 nos. m<sup>-3</sup> in station 3. The dominant species recorded were crustacean nauplius, copepod nauplius, *Oithona brevicornis* and *Acrocalanus gracilis* in station 1, gastropod veliger, *Oithona brevicornis*, copepod nauplius, *Acrocalanus gracilis*, cypris of barnacle and *Paracalanus parvus* in station 2 and copepod nauplis, crustacean nauplius, gastropod veliger, *Oithona brevicornis*, *Acrocalanus gracilis*, *Acartia erythrae* and *Euterpina acutifrons* in station 3.

The Species Richness Index 'D' for phytoplankton ranged from 2.15 to 5.38, 1.88 to 3.43 and 2.27 to 4.90 for the three stations respectively. For zooplankton the

value ranged from 3.33 to 7.13, 2.97 to 4.30 and 3.64 to 6.29 in stations 1, 2 and 3 respectively.

The Shannon-Weiner species diversity index ( $H'$ ) for phytoplankton ranged from 0.43 to 1.20, 0.89 to 1.25 and 0.89 to 1.26 bits / individual in stations 1, 2 and 3 respectively. For zooplankton the value ranged from 0.88 to 1.58, 0.96 to 1.32 and 1.16 to 1.51 bits / individual in stations 1, 2 and 3 respectively.

Phytoplankton density showed a significant (at 5% level) positive correlation with nitrate and salinity at stations 1 and 3 respectively. The zooplankton density showed significant (at 1% level) positive correlation with salinity and net primary productivity in station 2.

From the observations made during the present investigation, it can be concluded that the seagrass ecosystem (Station 1) is more productive with regard to the plankton biomass and diversity than the coral reef ecosystem (Station 2). This observation very well fall in line with the general principle that the waters of coral reefs will have limited plankton biomass due to its oligotrophic nature and the seagrass beds recycle nutrients between the sediments and water, which would help to support the growth of phytoplankton and further productivity in the ecosystem.

**Signature of the Student**

**Signature of the Chairman  
Advisory Committee**