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ECOLOGICAL STUDY ABOUT EDIBLE OYSTER BED OF *SACCOSTREA CUCULLATA* IN GOMATI CREEK NEAR DWARKA

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Abstract: In ecological study of oyster bed in Gomati creek (Fig.1), different variety of fauna and flora including molluscs, crustaceans, fouler and borers, fishes, sponges and planktons were recorded. In Gomati creek, water temperature fluctuated between 23 °C and 29 °C, salinity 36.5 to 37.5 ppt, pH 7.9 to 8.2 dissolved oxygen between 5.9 to 9.25 ppm and water transparency ranged from 22 to 38 cm during the study period. Ten species of marine algae and sixteen species of plankton were recorded from Gomati creek during present study. Disappearance of numbers of algae species was recorded from March and thereafter. However, the presence of *Ulva* sp. and *Monostroma* sp was noticed even during April-May

Keywords: Ecology, temperature, salinity, pH, Gomati creek.

Introduction

In India, *S. Cucullata* (Fig. 2) occurs at various places along the east and west coasts and around the Andaman and Lakshdweep islands (Rao, 1987). *S. cucullata* is distributed throughout the Indian coast on rocky substrata in shallow intertidal areas and withstand surf and wave action (Appukutan, 2005). It is found in Visakhapatnam, Madras, Killai backwaters, Mandapam, Pudumadam and Tuticorin on east coast and Cochin, Pavanji estuary, Kalinadhi, Goa, coastal waters and creeks of Maharashtra and Gujarat on west coast (Rao, 1987). *S. cucullata* is found growing attached to rocks in some creeks of Bombay coast and at Aramda, Dwarka, Adatra and Hanuman-dandi in Gujarat (Sarvaiya and Chhaya, 1983). Proper understanding of the ecology of the oyster bed is very essential in order to evaluate the influence of different physical, chemical and biological factors and their interaction.

Materials and method

The Gomati creek is formed by invagination of the Arabian sea on the west coast just touching the southern border of Dwarka village (22° 13' 55.59" N, 68° 58' 23.98" E). The mouth of the creek is 32 meters. The creek runs eastwards up to a distance of 178 meters, thereafter it runs to southward and end into the mangrove forest. The total length of the creek

is 2.8 Kms (Fig. 1) in which A indicates study area and B was a mangrove forest. Nagabhushanam and Bidarkar (1977) observed that during November and December the salinity was 30.5 ppt to 31.0 ppt and the temperature fluctuated from 22 °C to 27.5 °C. Bennet (1946) observed that oysters grow equally well on a hard rocky bottom or semihard mud firm enough to support their weight, while shifting sand and mud appeared to be unsuitable. Gosselin and Qian (1997) and Baker and Mann (1998) reported that five biotic and five abiotic factors affected bivalve mortality rates. According to authors, abiotic factors were desiccation, temperature, salinity, water motion, and oxygen depletion. Disease and predation generally had the greatest effect on *C. virginica* populations (Kennedy et al. 1996).

Some ecological aspects like temperature fluctuation, salinity variation, pH, DO, biotic and abiotic factors of the Gomati creek were recorded in the present study. These factors are most affect the survival, mortality rate, predation, growth, reproduction and all other physiological activities of bivalve. The extent of oyster bed, population density, data on associated organisms and water quality parameters such as temperature, salinity, dissolved oxygen, pH, and turbidity were recorded every month during extreme low water spring tides using standard methods (APHA, 1998).

Table 1. Physico chemical parameters of Gomati creek, Dwarka recorded every month during October to April

Month	Temperature (°C)		Salinity (ppt)	pH	Dissolved oxygen	Turbidity (cm)
	Air	Water				
October	33.00	29.00	34.00	7.90	6.70	38.00
November	35.00	23.00	39.00	7.50	7.90	33.00
December	29.00	26.00	33.00	7.80	9.25	22.00
January	18.00	23.00	39.00	8.20	8.40	23.00
February	25.00	23.00	36.00	7.80	7.80	34.00
March	26.00	28.00	35.00	8.10	6.30	36.00
April	28.00	26.00	39.00	7.90	5.90	38.00

Result and discussion

In the present investigation about habitat and ecology of edible oyster, *Saccostrea cucullata* topography has been studied in which it was found that, the upper littoral zone of the creek on both the side (east and west) is made up of dead madriporite corals, interspersed with mixture of sand and mud. About 250 meters from the mouth, the creek forms a lagoon. There is an

embankment made up of boulders across the creek. The central sea water stream is observed throughout the 24 hours tidal regime. The main habitat of *S. cucullata* comprised of dead corals, pebbles, boulders and sandy patches in between. The tidal fluctuation was -0.07 to 3.98 meters in the month of October -0.05 to 3.81 meters in November, -0.09 to 3.81 m in December, -0.01 to 3.97 in January, 0.23 to 3.93 m in February, 0.02 to 3.82 m in March and -0.09 to 3.92 in April.

The southern peripheral portion of the creek is surrounded by mangrove of the sp. *Avicenia marina* (Fig. 1). The ground was found very rich in so far as oysters are concerned. There are thousands of oysters in area comprising 500 sq. meters. These oysters preferred to settle on small pebbles as well as on huge boulders with as many as 89 numbers on a single boulder. A clean and transparent sea water flow is continuous in the central part of the creek, which also possessed sizable population of the oyster under study even during minus tide days. The oysters remain exposed for a considerable period during receding tides, but this exposure did not cause mortality of the animal as it thrived well up to the succeeding tidal waters. Mortality of oysters during monsoon due to heavy load of suspended material in the creek from the erosion of land was noticed.

Some biotic and abiotic factors were also has been studies in which major foulers of the oysters were *Balanus amphitrite* and marine algae. Borers like *Cymatium singulatus* drilling the shell and sucking the oyster meat were observed in the oyster ground. Damage due to the *Cliona* sp. of sponge was almost nil. Marine algae dominated during November march. Disappearance of numbers of alga species was recorded from second half of March and thereafter. However, the presence of *Ulva* sp. and *Monostroma* sp. was noticed even during April-May. There were fourteen species of plankton recorded during the study period viz. *Biddulphia* sp., *Chaetoceros* sp., *Coscinodiscus* sp., *Cladoceros*, *Copepod*, *Rhizosolenia* sp., *Thalassiiinema*, *nitzschoides*, *Nitzschia* sp., *Dictyocha octonaria.*, *Pleurosigma*, *Stauroneis*, *Gyrosigma* and *Thalassiothrix*.

There were many variety species of fauna recorded during study period i.e. molluscs like *Pernaviridis*, *Crassostrea gryphoides*, *Onchidium* sp., *Astreastellata*, *Cantharus undosus*, *Dosiniagibba*, *Nassathersites*, crabs viz. *Nicarcinus orientalis*, *Litocheirara angustifrons*, *Charybdis calliana*, *Atergatis* sp., fishes viz. *Therapon jarbua*, *Mugil cunnesius*, *M. cephalus*, *M. seheli*, *Argyrops spinifer*, sponges viz. *Cliona carpenteri*, *C. cellata*, *C. Vastifica* and annelid *Nerris* sp.

Looking to the overall presence of flora (seasonal) and fauna (diversified groups of animals), it can be concluded that the creek is highly productive in nature.

Abiotic Parameters

The water quality parameters of Gomati creek such as temperature, salinity, dissolved oxygen, pH, and turbidity were noted during the study period. In Gomati creek, water temperature fluctuated between 23 °C and 29 °C; salinity 36.5 to 37.5 ppt, pH 7.9 to 8.2 dissolved oxygen between 5.9 to 9.25 ppm and water transparency ranged from 22 to 38 cm (Table 1). The water temperature varied from 23 °C to 29 °C during study period October to April (Table 1). Maximum sea water temperature was obtained 29 °C in October month (Fig. 3). Water temperature of the Gomati creek was minimum 23 °C in November, January and February. Fig. 3 shows that during the period from October to April sea water of Gomati creek did not show significant variation in salinity. Maximum salinity (37.5 ppt) was observed in November. In December salinity was low (37.3) with slight fluctuation (Table 1). Fig. 4 shows monthly fluctuation of dissolved oxygen level during October to April. Minimum dissolved oxygen was found (5.9 ppm) in April while 9.25 ppm as maximum in December. The mean dissolved oxygen level during the study period was 7.46 ppm (Table 1). DO content of the water was higher during high tide period. Fig. 4 shows that there was considerable fluctuation of pH of sea water from Gomati creek. The data revealed that the maximum pH value was 8.2 in October and January and minimum was 7.9 in April (Table 1). Water was observed highly turbid in October and April month while it was less turbid in December (Fig. 5).

The result indicated that flora and fauna available from study area (Gomati creek) preferring high pH level. In the present study, minimum turbidity was found 22 cm in December and maximum was 38 cm in October. Mortality of oysters was observed during monsoon season due to heavy load of suspended material in creek from the erosion of land.

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Fig.1. Location of Gomati creek, Dwarka, Gujarat

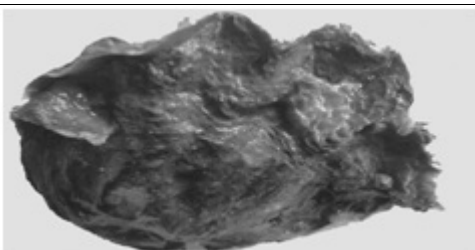


Fig. 2. Edible oyster *Saccostreacucullata*

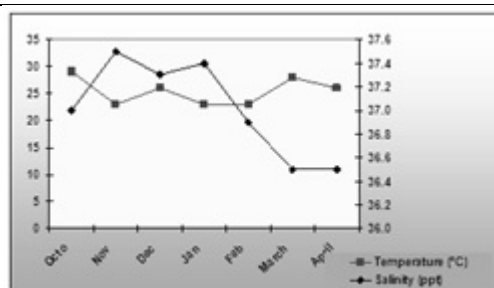


Fig. 3. Temperature (°C) and salinity (ppt) of seawater of Gomati creek, Dwarka recorded every month during October to April.

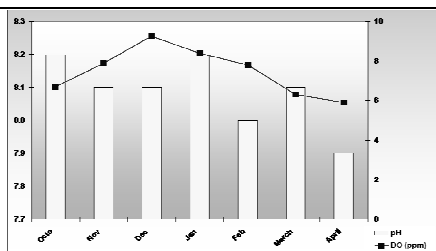


Fig. 4. Dissolved oxygen (ppm) and pH of seawater of Gomati creek, Dwarka recorded every month during October to April.

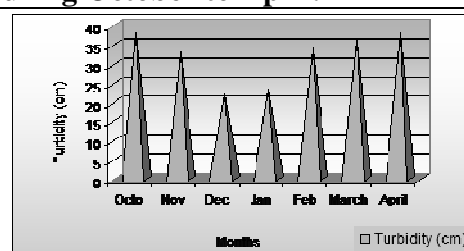


Fig.5. Turbidity (cm) of Gomati creek, Dwarka recorded every month during October to April.

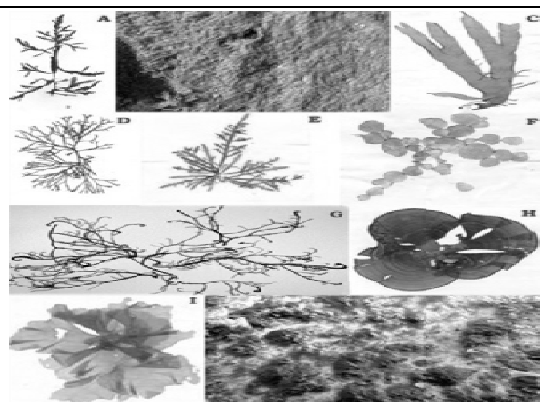


Fig. 6. Other species of marine algae found from Gomati creek were (A) *Sargassum johnstonii*, (B) *Monostroma* sp. (C) *Spathoglossum* sp. (D) *Gracilaria dura* (E) *Champia indica* (F) *Helimenia venusta*, (G) *Hypnea musciformis*, (H) *Padina tetrastomatica* (I) *Ulva* sp. (J) *Polysiphonia marina*.