

SURVEY OF WINDOWPANE OYSTER (*PLACENTA PLACENTA*) RESOURCES IN THE KAKINADA BAY

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ABSTRACT

An estimated population of live window-pane oyster of 8,945.3 tonnes and 43,347.6 tonnes of shells of dead oyster is in the Kakinada Bay, spread out in an area of 132 sq. km. The live oyster is confined to western and southern sides of the Bay which are known to be relatively more productive. The shells of dead oyster are spread all over the Bay with very large concentration on the eastern side. The fishermen remove window-pane oyster available on the southern and western sides during January-May and the catches are utilised mainly for manufacture of lime. It is suggested that extension of fishing season along with extension of fishing ground to the eastern and central portions of the Bay will result in greater yield of this resource. There is considerable scope in utilisation of this resource by extracting pearls formed in them and also flesh being used as an item of food.

INTRODUCTION

The window-pane oyster *Placenta placenta* (Linnaeus) is one of the important constituents of the molluscan resources of the Indian waters. There are several reports on its distribution, anatomy and fisheries from India (Hornell 1909 a, b; 1949; Rai 1932; Moses 1939, 1947; Radhakrishna and Ganapati 1967; Jones 1970; Narasimham 1973; Bhavanarayana and Raghunath 1973; Varghese 1976), but surveys to estimate the population abundance have not been conducted. It forms fisheries of considerable magnitude in the Okhamandal coast and in Kakinada Bay; an estimated 4000 tonnes being landed at Kakinada annually (Narasimham 1973). In addition to being a producer of pearls, this oyster gained importance in recent years because there is considerable demand for its right valve (the flat shell with prominent cardinal teeth), from the overseas markets for purposes of making curios, buttons, etc. At present the shells are used, locally mainly for making lime. It was therefore felt that a survey of this resource in the Kakinada Bay would enable us to estimate its abundance and understand the distribution pattern in different parts of the Bay. The following account relates to the results of the survey conducted during March-May 1976 and February-March 1977.

PHYSIOGRAPHY OF KAKINADA BAY

The Kakinada Bay, spreading over an area of 132 sq.km is situated between $81^{\circ}15'-81^{\circ}22'E$ longitude and $16^{\circ}51'-17^{\circ}N$ latitude (Fig. 1) It opens into the sea on its northern side and is bordered by mainland on the western side, by mangrove forests on southern side and by a narrow sand bar on its eastern side. Several canals and a few rivers open into the bay mainly on its southern side. The bay is very shallow excepting its northern border which is relatively deeper. The maximum depth in the bay is 7.8 meters (Fig. 1). The bottom of the bay is of silty clay, excepting its north eastern side which is sandy and the western side which is clayey (Radhakrishna and Ganapati 1967).

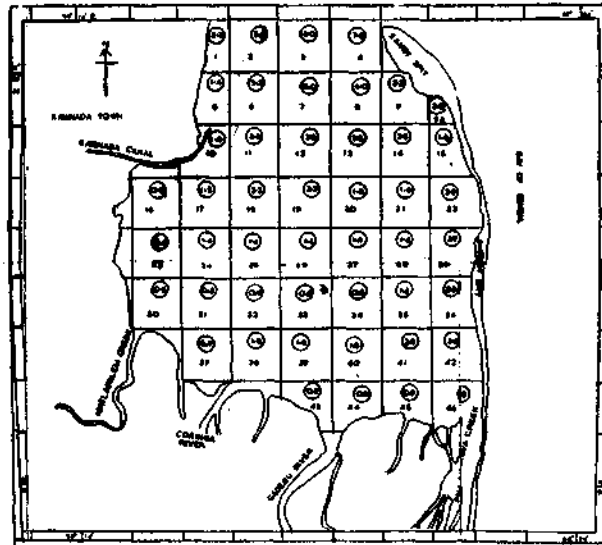


FIG. 1. Map of Kakinada Bay showing sampling stations (maximum depth of each station is given in circles).

MATERIALS AND METHODS

For purpose of survey, the bay was divided into 46 stations (Fig. 1), each station with a spread of 1 nautical sq. mile (3.4299 sq. km) excepting those bordering the land mass. Samples were collected from a country craft excepting in the deeper areas where a 34' mechanised boat fitted with a 11.75 H.P. engine belonging to the Fisheries Training Institute, Kakinada, was used. The stations were located with the help of a Mariner's Compass by taking shore bearings. Two experienced divers were engaged for collection of samples. From each station three samples were taken by hand-picking each sampling area measuring 4 sq. m and separated (in each station) by a distance of about 75 m. The sampling area was demarkated by fixing four bamboo poles tied with nylon rope near the bottom and also near the top. All the specimens available in the

4 sq. m sampling area were collected. After collection, the specimens were washed and cleaned to remove mud, fouling organisms etc. For each sample, data on total weight and numbers were recorded separately for live and dead individuals; length measurements were also taken for live specimens. On the basis of these data the population density by weights and numbers was estimated for live and dead oysters separately for each station and for the bay as a whole.

RESULTS

Distribution and abundance of live individuals:

Particulars regarding the estimated weights and numbers of live window-pane oyster in each station of the bay are presented in table 1; the distribution pattern of live oyster in the bay is indicated in figure 3. It may be seen that of the 46 stations surveyed, only in 18 stations live individuals occurred. Thus, the live oyster is spread over an area of 59 sq. km (44.7%) of the bay area. It may also be noted from figure 3, that the live window-pane oyster forms a contiguous bed in the bay; starting from the north-western side, the bed runs continuously along the western side (excepting station 30 which is entirely populated by bed of *Modiolus* sp.) and extends up to the south eastern side. The central and eastern portions of the bay are devoid of live window-pane oyster excepting for a small patch in station 36 (Fig. 3).

A total of 8945.3tonnes (2480.4 lakhs) of live *Placenta placenta* is estimated to be available in an area of about 59 sq. km of the Bay (Table 1). Of

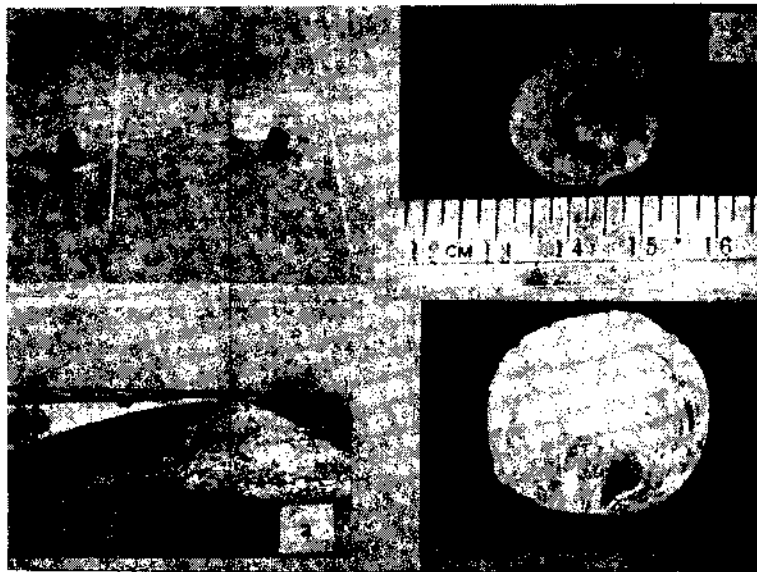


FIG. 2. (1) divers taking samples; (2) commercially collected oyster shells for lime-burning; (3) a spat of the oyster; (4) the flat right valve of window-pane oyster.

TABLE 1. Estimates (weights and numbers) of window-pane oyster population in each square of the Kakinada Bay along with the length range and modal lengths.

Station No.	Date of Sampling	Live				Dead	
		Estimated weight (tonnes)	Estimated numbers (lakhs)	Length range (mm)	Modal length (mm)	Estimated weight (tonnes)	Estimated numbers (lakhs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	20-2-77	—	—	—	—	3.7	32.9
2	21-2-77	—	—	—	—	14.6	25.7
3	4-3-77	—	—	—	—	—	—
4	4-3-77	—	—	—	—	22.7	64.3
5	2-3-77	—	—	—	—	192.9	366.6
6	10-3-77	0.6	5.7	20-29	25	63.5	245.8
7	11-3-77	3.4	30.0	10-39	25	246.5	263.7
8	12-3-77	—	—	—	—	118.3	604.5
9	13-3-77	—	—	—	—	3.4	4.3
9A	13-3-77	—	—	—	—	149.0	62.2
10	30-4-77	128.3	25.7	30-109	75	865.2	440.2
11	14-3-77	—	—	—	—	6.0	14.3
12	15-3-77	—	—	—	—	125.6	90.0
13	21-3-77	—	—	—	—	137.2	111.5
14	21-3-77	—	—	—	—	8231.8	4347.4
15	5-3-77	—	—	—	—	—	—
16	22-4-76	456.5	234.4	20-109	35,75	879.5	468.8
17	14-5-76	522.5	222.9	40-89	65	826.6	411.6
18	23-3-77	—	—	—	—	7.3	47.2
19	23-3-77	—	—	—	—	49.3	38.6
20	22-3-77	—	—	—	—	108.3	60.0
21	22-3-77	—	—	—	—	3622.8	2748.2
22	27-2-77	—	—	—	—	855.3	964.7
23	15-4-76	28.6	5.7	70-79	75	1932.5	1014.7
24	17-4-76	385.6	77.2	40-159	75,135	989.8	491.6
25	21-4-76	71.5	14.3	110-145	135	378.4	191.5
26	26-3-77	—	—	—	—	—	—
27	26-3-77	—	—	—	—	1149.0	767.4
28	23-3-77	—	—	—	—	2861.1	1477.7
29	6-3-77	—	—	—	—	489.6	740.3
30	3-5-76	—	—	—	—	76.1	34.3

TABLE 1. (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
31	19-4-76	254.4	45.7	50-149	75,125	1586.6	851.8
32	20-4-76	387.3	77.2	40-139	65,125	630.8	323.0
33	26-3-77	—	—	—	—	134.3	348.7
34	24-3-77	—	—	—	—	2045.1	836.0
35	24-3-77	—	—	—	—	1710.7	2010.8
36	15-4-76	75.0	21.4	90-119	115	945.8	947.5
37	4-5-76	24.3	22.9	20-79	55	324.4	114.3
38	8-5-76	1400.5	182.9	70-169	95,145	1855.0	823.2
39	5-5-76	303.0	28.6	110-139	115	1277.6	814.6
40	25-3-76	3978.7	1399.4	60-109	85	2685.6	1605.2
41	16-4-76	—	—	—	—	2341.3	1153.3
42	7-3-77	—	—	—	—	1540.6	3181.2
43	11-5-76	323.7	28.6	110-149	125	425.9	168.6
44	10-5-76	497.3	51.4	90-149	125	5188	194.4
45	6-5-76	104.4	6.4	130-149	145	270.3	100.8
46	9-5-76	—	—	—	—	648.8	425.9
Total:		8945.3	2480.4	—	—	43347.6	30029.3

the 18 stations occupied by live oyster, 7 stations (21.4 sq. km) on the southern side (stations 37, 38, 39, 40, 43, 44, 45) sustain a live population of 6632.3 tonnes (1720.2 lakhs), accounting for 74.1% by weight and 69.4% by numbers, of the total live population in the entire bay.

The length range and modal lengths of live window-pane oysters, in each station are presented in Table 1. Specimens measuring less than 30 mm (spat) (see, Fig. 2) were recorded from stations 6, 7, 10, 16 and 37 during March-May period. Stations 6 and 7 contained (exclusively) large number of spat of the length range 10-39 mm on 10th and 11th March 1977.

Distribution and abundance of shells of dead oyster:

A total of 43,347.6 tonnes of shells of dead individuals were estimated to be available in the bay. These shells were distributed, in varying quantities, in the entire bay excepting stations 3, 15 and 26 (Table 1). To find out the relative abundance of dead oyster in different areas the bay was divided into 5 regions (Table 2 and fig. 1). The estimated quantities of dead oysters in each of these regions and their percentage composition in the total are given in Table 2.

TABLE 2. Relative abundance of shells of *P. placenta* in different regions of bay.

Regions	Stations (with ref. Fig. 1)	Estimated dead shells (in tons)	Percentage in total
Northern	1 to 9	814.6	1.9
Western	10, 16, 17, 23, 24, 30, 31	7156.3	16.5
Southern	37 to 46	11888.3	27.4
Eastern	14, 15, 21, 22, 28, 29, 35, 36	18717.1	43.2
Central	11-13, 18-20, 25-27 32-34	4771.3	11.0

The eastern region with 18717.1 tonnes showed the maximum concentration. Station 14 on the eastern side of the bay alone had the greatest accumulation of dead oyster viz. 8321.8 tonnes (Table 1) forming 44% of the estimated *P. placenta* shells available on the eastern side and 19% of the total estimated dead oyster shells available in the entire bay. It is interesting to note that this is almost devoid of live oyster (Fig. 3). Next in importance is the southern region; with an estimated dead oyster concentration of 11,888.3 tonnes. This area accounts for 27.4% (by weight) of total dead shells estimated to be present in the Bay. It may be noticed that the southern region has the maximum live window-pane oyster population also.

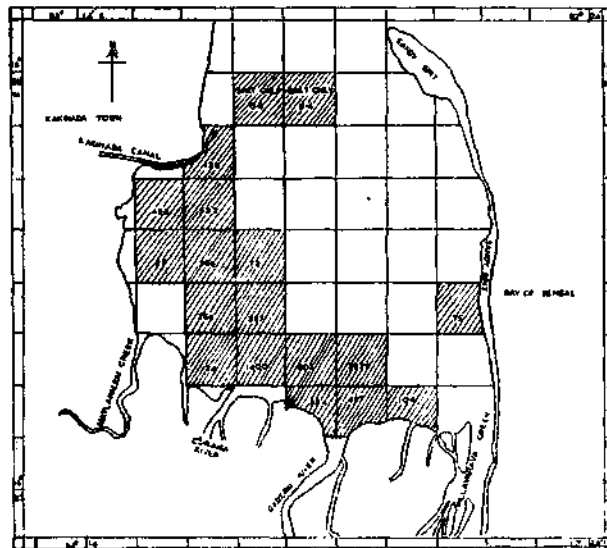


FIG. 3. Distribution of live window-pane oysters in different stations (numerals indicate the estimated quantities in tonnes).

UTILIZATION

The window-pane oyster has several uses. Though the meat is at present not consumed in India, Rao (1963) indicated that the meat of this oyster is of good quality. It is for this reason, Qasim (1975) felt that this oyster can also be cultured. The meat of this oyster is being used in the preparation of *Bagoong*, *adobo*, *chowder* and kapis omlet in the Philippines (Villadolid 1952). Recent studies by Sarvaiya (1977) showed that the meat content varied from 6.9 to 20.8% of total weight and the protein content ranged from 42.0 to 63.8% on dry weight basis for the oysters of the length range 80-155 mm.

The shells are used for glazing window, as decorative pieces in gardens, and for making curios and lime. Until very recently the shells were used only in lime industry at Kakinada but of late there is good export trade for the flat right valve (Fig. 2). During 1968-1976; about 42 tonnes of right valve alone were exported to Hong Kong and Japan by private traders from Kakinada and of late there is some demand from Korea also.

The window-pane oyster is known to produce small pearls of poor quality which are used in indigenous medicine. According to Varghese (1976), the bigger pearls are used for ornamental purposes even if the colour is poor. He also described the methods of pearl extraction followed in Gujarat. Recent studies (Murty, in press) on the occurrence of natural pearls in *P. placenta* revealed that 26.2% of the population (by numbers) in the Kakinada Bay produced natural pearls. On the basis of the available data, it is estimated that about 51 tonnes of live window-pane oyster from Kakinada Bay yield one kilogram of pearls which are priced at Rs. 5,000/- on the basis of the price valuation method followed by Varghese (1976).

REMARKS

Radhakrishna and Ganapati (1967) made a survey of the bottom fauna of the Kakinada Bay. On the basis of samples obtained from fixed stations they showed that the region off the Garden mouth constituted the Placenta region. The present study revealed that live population of this species is distributed on the western and southern (including the region off Gaderu mouth) sides of the bay with greater density in the latter. The bottom sediment in these regions is of fine clay mixed with varying quantities of silt rich in organic carbon. These regions are the most productive ones in the bay (Radhakrishna and Ganapati 1967).

Fishing for molluscs (including *P. placenta*) in the bay is done by hand-picking during low tide periods during January-May. The fishing activity is confined to the western and southern sides of the bay only. As stated earlier, there are large quantities of shells of dead oysters on the eastern and central portions of the bay. These regions being relatively deeper, fishing by hand-picking

even during the low tide periods is difficult. If, however, fishing by suitable methods is extended to these regions and if the activity is continued round the year, the production can be increased considerably. Extraction of pearls would augment the income of the fishermen without affecting the usual earnings by lime production and shell export trade. There is urgent need to educate and train the fishermen in suitable methods of pearl extraction as is practised in the Gujarat coast (Varghese 1976).

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