OBSERVATIONS ON THE SEASONAL PRAWN FISHERY OF THE LITTLE RANN OF KUTCH DURING 1980

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ABSTRACT

The Little Rann of Kutch supports a lucrative seasonal prawn fishery, principally constituted by juveniles of *Metapenaeus kutchensis*, during the monsoon months. About 2770 fishermen are actively engaged in the fishery, with 307 boats and 1600 nets. The craft and gear operating the fishery are described. An estimated catch of 2311.5 tonnes of prawns was exploited during the 1980 season. Surbari is the biggest of the landing centres with an estimated catch of 688.7 t. Juveniles of 71-95 mm length formed the mainstay of the fishery.

The existing processing and marketing methods are described along with comments on socio-economic conditions of the fishermen.

INTRODUCTION

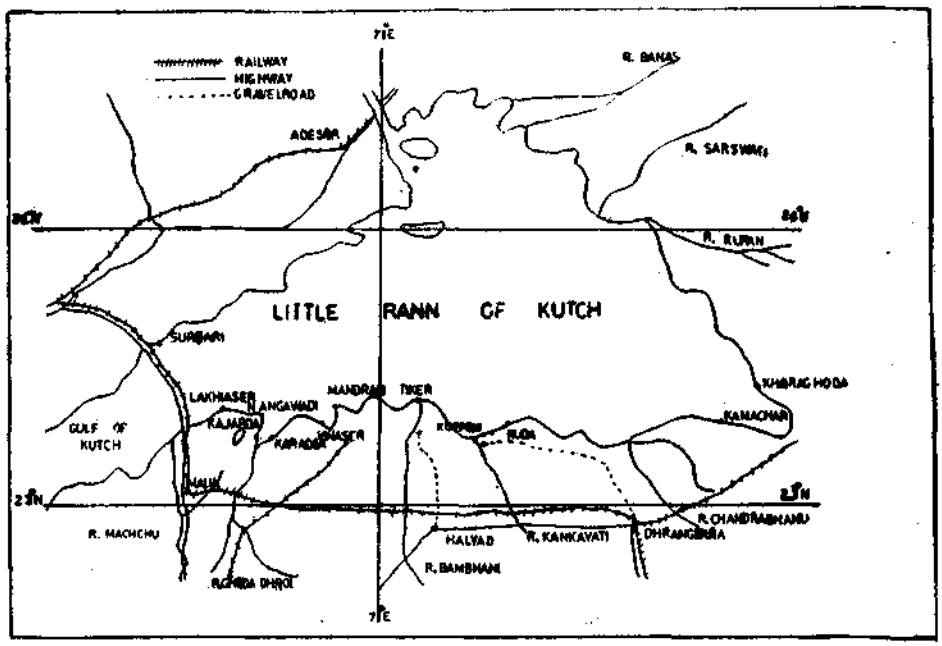
The Gulf of Kutch and adjacent estuarine system supports a prawn fishery of considerable magnitude. Srivatsa (1953) reported on the prawn fishery of the Gulf of Kutch and Lakumb (1960) described the marketing and socio-economic condition of the fishermen of the region. Ramamurthy (1963a) described the prawn fishery of the creeks and also (1963b) studied the prawn fishery at Adesar camp. George et al (1963) described the species supporting the prawn fishery in the Kutch region as *M. kutchensis*. Ramamurthy (1964) reported *M. stebbingi* also from these waters. George and Rao (1966) described another new species, *M. alcocki*, from these waters. Later Ramamurthy (1967) studied the biology of *M. kutchensis* and *M. brevicornis* from the Gulf of Kutch. Recently Sarvaiya (1981) studied the prawn fishery at Cherowari (Surbari), Sukhper and Lakhpat. No information is available on the monsoon fishery for *M. kutchensis* in the Little Rann of Kutch. Hence, a study was conducted on the seasonal prawn fishery of this area during 1980 and the data presented in this paper.

TOPOGRAPHY AND THE AREA OF FISHERY

The Little Rann of Kutch has an area of approximately 3000 Sq. Km, bordering Rajkot and Surendranagar districts on the southern side and Kutch district on the northern side (Fig. 1). The fishery for prawns exists only in an

area of 1,200 Sq. Km on the southern border of the Little Rann, as the depth in this area is more and bottom is muddy, making it favourable for operating drag nets.

The Little Rann is dry from October to June except for the Adesar area (300 Sq. Km). With the onset of monsoon, in the third week of June, the rivers—the Banas, the Saraswati, the Rupan, the Umai, the Chandrabhaga, the Phulka, the Kanakavati, the Bambhan, the Godadhroi and the Machchu—discharge in the Little Rann. By the middle of July, generally, the monsoon picks up momentum and the Rann gets flooded. During this period the Little Rann with its fresh



FG. 1. Map of the Little Rann Kutch showing the prawn landing centres

water is connected to the Gulf of Kutch, facilitating entry for fish and prawns into the Rann. However, during the intense monsoon (July) the salinity is very low and hence the migration of prawns is at a minimum. But at this time there is a good fishery for *Hilsa* spp. in the Little Rann for about 10 days. With the cessation of heavy rains, salinity increases in the Rann and an estuarine environment is established. Juvenile prawns migrate into this water in large quantities and are caught. Generally the prawn fishery starts by the first week of July and ends by the middle of October.

Data Collection

As the region is remote and unapproachable, initial information on the region was acquired by contracting prawn dealers at Veraval and later at Surbari.

All the landing centres were visited and a survey of crafts, gear and fishermen population was made. As Surbari is the biggest of the landing centres, regular observations on prawn catch, effort, biological charactersitics, salinity and temperature were made on alternate days during the entire season. Data on salinity and temperature were collected uniformly during the day low tide period.

Craft and Gears

The craft employed is a Malia type of plank-built ribbed boat locally known as 'Odie.' The dimensions vary from 5.4 x 0.9 x 0.5 to 6.6 x 1.3 x 0.6. The bottom of the boat is flat to facilitate easy beaching on the estuarine mud. The gear used is a bag net, locally known as 'Gunja' having 397 cm length, 200 cm height and 114 cm width. The mesh sizes at mouth, belly and cod end are respectively 40 mm, 20 mm and 15 mm.

The net has a square mouth and it gradually tapers, as a cone, to an opening at the end. Generally the net is made up of one anterior and one posterior piece. At Surbari and Lakhiaser the net is used as stake net. A battery of nets is set against the outgoing tidal flow tying to stakes. Periodically the net is lifted and emptied into the boat. Generally two people go in a boat and operate 3-8 gunjas.

At the other centres, where the gunjas are operated as drag nets, two fishermen hold the sticks that are tied to the sides of the net and drag the net along the bottom. This operation is generally conducted at depth less than 0.75 m where there is little tidal force. Generally, 15-20 people jointly take a boat and empty their catch into it to avoid unnecessary weight in the net. In this kind of operation the boat is used as a mode of transport only.

Landing Centres

Except at Surbari no fisherman stays in the region after the prawn fishing season. During the season the fishermen of Malia, Navlakhi, and Surbari set up camps at Surbari (Cherowari), Lakhiaser, Nangavadi, Karadia, Vinaser, Mandraki and Tikar (Fig. 1). Apart from the traditional fishermen, farm labourers and factory workers also fish for prawns at Kuda, Kuppeni, Kanachar, Kharaghoda. Lakumb (1960) observed camps at Sossaria, Tapal, Lambidivi, Bhowada, Dhari, Mathol and Cherowari (Surbari), all of which are westward of Surbari village. Lakumb (1960) did not mention about the existance of fishing activity east of surbari. Sarvaiya (1981) mentioned of the existance of the fishery at these places in 1973-74, but did not give any details of the fishery. At present, there is no prawn fishery at these places except at Surbari. It would appear that fishermen who were operating the monsoon fishery have abondoned those centres and established camps between Surbari and Kharaghoda. About 2770 fishermen are actively engaged in the fishery with about 307 boats and 1620 nets in 1980 (Table 1).

TABLE 1. *Particulars of Craft, Gear and Population of Surbari area landing centres in* 1980.

Landing Centres	Fishermen population	Active fishermen	No. of boats	No. of Gunjas
Surbari	2500	600	200	550
Lakhiaser	200	80	30	90
Nangavadi	750	280	10	120
Kajarada	150	50	3	20
Karadia	1100	600	30	300
Vinaser	150	80	2	35
Mandraki	500	200	3	100
Tikar	300	200	2	80
Kuppeni	600	400	5	200
Kuda	500	200	20	90
Kanachar	80	20	—	10
Kharagoda	100	60	2	25
Total	6930	2770	307	1620

TREND IN PRAWN PRODUCTION

The fishery continued for about 70 days (15-7-1980 to 25-9-1980) at Surbari, Lakhiaser, Nangavadi and Kajarada; 65 days at Vinaser, Mandraki and Tikar; 55 days at Kuppeni and Kuda; and 50 days at Kanachar and Kharaghoda. *Metapenaeus kutchensis* formed about 99% of the prawn catches of the area. *Macrobrachium malcomsonii, Palaemon stylifera* and *Parapenaeopsis sculptilis* contributed to the rest of the catch. Juveniles of polynemids, catfish, mullets, gobioids, clupeids and freshwater carps were also represented in the catches in small quantities. Estimated monthly landings of *M. kutchensis* at different landing centres are presented in Table 2. Surbari was the biggest landing centre, with a catch of 688.7 t, followed by Kajarda (512 tonnes) and Kuppeni (300 tonnes). Ramamurthy (1967) estimated the catch at Surbari for 1959 and 1961 at 880 and 700 t, respectively, and noted a complete failure of the fishery in 1960. Deshmukh (1975) observed a catch of 145 t during 1962 and a failure of the fishery in 1963. However, his observation of 1962 started from September and hence does not represent the trend of the whole season. Sarvaiya (1981) estimated a catch of 381 t for August-October 1973 at Cherowari (Surbari).

Prawn catches at Surbari in relation to salinity and temperature are presented in Table 3. Prawn catches were better when the salinity fluctuated between 8.43 and 19.12 ‰. Ramamurthy (1967) and Deshmukh (1975) attributed the failure of the fishery for 1960 and 1963 respectively to the higher

TABLE 2. *Estimated prawn landings in tonnes at different landing centres in the Surbari area in* 1980.

Landing centres	July	August	September	Total
Surbari	257.5	395.0	36.2	688.7
Lakhiaser	38.7	59.2	5.4	103.3
Nangavadi	36.0	108.0	48.0	192.0
Kajarada	96.0	288.0	128.0	512.0
Vinaser	10.5	31.5	14.0	56.0
Mandraki	30.0	90.0	40.0	160.0
Tikar	24.0	72.0	32.0	128.0
Kuppeni	60.0	180.0	60.0	300.0
Kuda	18.0	81.0	27.0	126.0
Kanachar	2.0	9.0	2.0	13.0
Kharagoda	5.0	22.5	5.0	32.5
Total	577.7	1336.2	397.6	2311.5

salinities prevailing during these years because of lower rainfall. Sarvaiya (1981) was also of the opinion that the prawn catch at Cherowari is inversely related to salinity. During 1980, the fishery would have come to a close on 4-9-1980 but for the rains and subsequent flooding of the Rann after 9-9-1980. It is evident therefore that the lower salinity resulting from good rainfall is responsible for better prawn fishery. Although Ramamurthy (1967) found a good correlation among these parameters, temperature and moonphase did not appear to have any influence on the prawn catches.

It is seen from Table 2 that an estimated 2311.5 t of *M. kutchensis* was exploited in the season from the Rann; 577.7 t in July, 1336.2 t in August and 397.6 t in September. Ramamurthy (1963) estimated a catch of 4.5 t for the Adesar area which, however, is not covered in the present investigation. The cost of prawn varied from Rs. 3 to 6 per kg at different centres. Even at this lower price of Rs. 3 per Kg, the fishermen might have got about 70 lakh rupees during the 1980 season.

MARKETING

Most of the freezing plants at Veraval and Porbandar establish their camps at Surbari during the prawn season. Marketing facilities at Surbari are good as the place is only two Km from the Kandla highway. Entire catch of Surbari goes for freezing to Veraval and Porbandar, sometimes even to Bombay. At the other centres marketing facilities are meagre, as all the places are far

TABLE 3. *Prawn catches at Surbari in relation to salinity during July-Sep.* 1980.

Date	Units operated	Catch in Kg	C/E in Kg	Salinity ‰	Water temperature °C
29/7	147	16069	109.5	10.15	28.0
6/8	55	1306	23.75	13.05	24.5
8/8	51	2805	55.00	10.51	26.0
10/8	108	11880	110.00	12.33	25.0
14/8	78	14300	183.33	11.42	28.1
18/8	78	10053	128.89	8.43	28.0
22/8	85	18530	218.00	19.03	28.0
24/8	72	11088	154.00	14.32	27.5
26/8	89	22072	248.00	16.31	25.8
28/8	65	9370	144.14	19.12	28.0
5/9		No fishing		51.66	—
7/9		No fishing		25.38	—
9/9		No fishing		35.96	—
11/9	35	1809	51.68	24.02	—

removed from the main roads. As the season generally coincides with the monsoon even the meagre transport facilities normally exist cannot be put to use. At these remote centres a part of the catch is boiled and sundried. Whenever possible the catch is transported to nearby highways in camel carts, tractors and headloads.

SOCIO-ECONOMIC CONDITIONS OF FISHERMEN

Living conditions of the fishermen are very poor at all these camps. There is acute shortage of drinking water, which at times has to be brought from 4 to 5 Km away. The fishermen are generally heavily indebted as they are in the habit of borrowing beyond their repaying capacity. General condition of health is also very poor because of unhygienic practices and malnutrition. Generally the fishermen get very low price as a major share goes to the middle men, who act as the agents for the freezing factories. Most of the fishermen are not members of any co-operative society.

BIOLOGY OF THE PRINCIPAL SPECIES

Size composition: Monthwise size composition of *M. kutchensis* at Surbari is presented in Fig. 2. *M. kutchensis* of 41-115 mm in total length were represented in the catch, but juveniles of 71-95 mm formed the mainstay throughout the period with minor fluctuations, as observed by Ramamurthy (1967). However, Deshmukh (1975) found 31-65 mm size groups dominating the fishery in June-

August, 1963. His samples were obtained from experimental fishing with net of a different mesh size than that of the commercial gear, and this might explain the size difference reported by him.

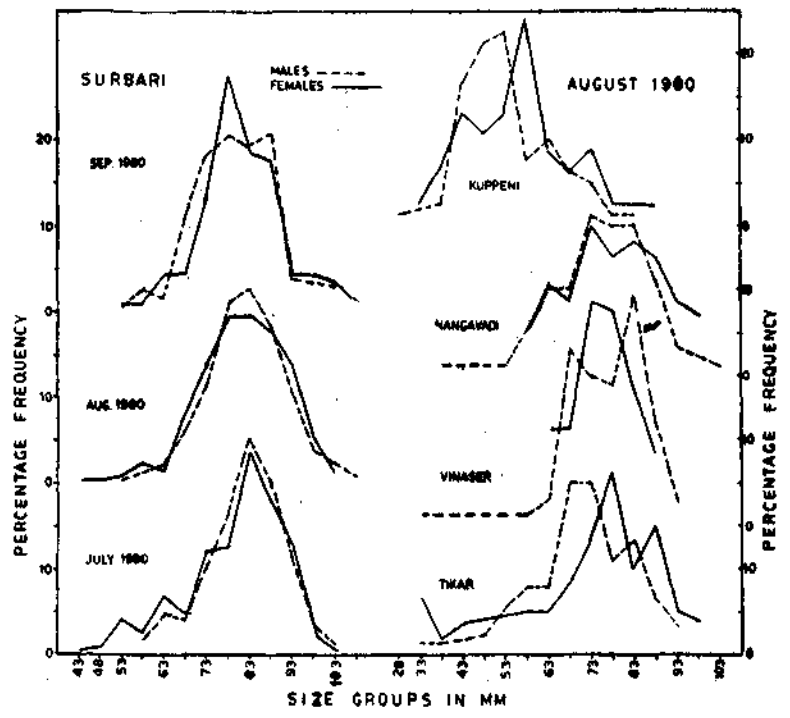


FIG. 2. Length-frequency distribution of *M. butchensis* at different landing centres.

Size composition at Nangavadi, Vinaser and Tikar was similar to that at Surbari, whereas at Kuppeni smaller size groups (43-63 mm) dominated the catches.

Sex ratio: At Surbari, in the beginning of the season (July), males and females were observed in more or less equal proportion and, then onwards, the proportion of males increased gradually (Table 4). The data for August from different centres show that the proportion of males was more in the interior centres like Vinaser and Kuppeni. It is possible that females grow fast and leave the upper reaches early than the males. Deshmukh (1975) and Sarvaiya (1978) found a higher proportion of females in the catches at Surbari during 1962 and 1973 season, respectively.

Food and feeding: In all, 143 specimens of *M. kutchensis*, ranging in size from 46 mm to 98 mm in total length, collected from different landing centres of the Little Rann of Kutch, were studied for their stomach contents. The contents were grouped as prawns, copepods, other crustaceans, algae, angiosperm matter, fish,

TABLE 4. *Sex ratio of* M. kutchensis *at different landing centres of the Surbari area in* 1980.

Landing centres	Months	Percentage of Males	Percentage of Females	No. of specimens observed
Surbari	Jul	49.39	50.11	435
Surbari	Aug	51.52	48.48	656
Nangavadi	Aug	61.07	38.93	149
Vinaser	Aug	67.88	32.12	137
Kuppeni	Aug	63.49	36.51	126
Tikar	Aug	59.87	40.13	152
Surbari	Sep	54.94	45.06	253

molluscan shells, sand, and detritus. Other crustaceans included amphipods, tanaidaceans, isopods, decapod larvae and mysids. Prawns were mostly represented by nonpenaeids; and sometimes cannibalism was also noticed. Among the copepods, harpacticoids were more common in the stomach contents. Algae were mainly comprised of filamentous blue-green algae and angiosperm matter of mangroove leaves and roots. Fish contents in the stomach could not be identified. Detritus included mud, foraminifera, radiolaria and other unidentified matter.

The total volumes of stomach contents at Surbari and other centres are given in Table 5. Pooled data for all the centres indicate that 43 of the 143

TABLE 5. *Numbers and percentage (in brackets) of* M. kutchensis *in different feeding conditions from different centres.*

Centres	Full	¾ full	½ full	¼ full	Traces	Empty	No. of specimens observed
Surbari	6 (6.67)	10 (11.11)	15 (16.67)	20 (22.22)	24 (26.67)	15 (16.67)	90
Kajarada	1 (8.33)	4 (33.33)	2 (16.67)	4 (33.33)	1 (8.33)	—	12
Vinaser	12 (100)	—	—	—	—	—	12
Tikar	2 (15.38)	3 (23.08)	4 (30.77)	1 (7.69)	3 (23.08)	—	13
Kuppeni	14 (87.50)	1 (6.25)	1 (6.25)	—	—	—	16
Pooled	35 (24.48)	18 (12.59)	22 (15.38)	25 (17.48)	28 (19.58)	15 (10.09)	143

specimens observed were either empty or with traces of food and 35 (24.48%) were full. The ¼ full, ½ full and ¾ full stomaches were 18 (12.59%), 22 (15.38%) and 25 (19.58%) respectively. Specimens observed from Vinaser were all with full stomachs, whereas those from Kuppeni had stomachs full in 87.5% of the observed specimens. Empty stomachs were not observed from the samples of Kajarada, Vinaser, Tikar and Kuppeni, while at Surbari 16.67% were empty and 26.67% with traces of food. It appears that prawns in the interior centers like Kajarada, Vinaser, Tikar and Kuppeni had better feeding facility than at Surbari.

Other crustaceans, copepods, algae, sand and detritus were observed in the samples of all landing centres (Table 6). Prawns and fish were observed only from the samples of Surbari, Kajarada and Tikar. Angiosperm matter was observed in the samples of all the centres except from Kuppeni, whereas molluscan shells were absent in the samples from Vinaser. Detritus, algae, other crustaceans and prawns were dominant constituents of the stomach contents from the samples of Surbari. In the samples of Kajarada detritus, prawn and fish formed the bulk of the stomach contents, whereas in the samples of Vinaser algae, copepods, angiosperm matter and other crustaceans contributed better to the food of prawns. Detritus, algae and other crustaceans formed the bulk of food of the prawns at Tikar whereas at Kuppeni algae, sand, other crustaceans and copepods contributed to the food of *M. kutchensis*.

TABLE 6. *Percentage composition of different food items of* M. kutchensis *from different landing centres.*

Food items	Surbari	Kajarada	Vinaser	Tikar	Kuppeni	Pooled
Other crustaceans	11.79	3.96	11.67	14.62	9.37	10.28
Copepods	5.09	1.25	15.00	4.81	9.37	7.11
Prawns	10.90	17.92	—	9.23	—	7.61
Fish	3.05	16.25	—	5.77	—	5.01
Algae	14.58	4.99	51.67	22.23	61.88	31.07
Anagiosperm matter	7.27	1.25	12.50	8.15	—	5.83
Molluscan shells	1.62	4.79	—	1.15	2.19	1.95
Sand	3.57	6.45	5.83	5.77	10.00	6.32
Detritus	42.13	43.14	3.33	28.27	7.19	24.81

Panikkar and Menon (1956) consider prawns as detritus feeders. But Hall (1962) was of the opinion that penaeids in general cannot be considered

as detritus feeders. Gopalakrishnan (1952), George (1959), Subramanyam (1967), and Kuttyamma (1974) considered prawns as omnivores. Ramamurthy (1967) studying the food of *M. kutchensis* from the Gulf of Kutch recorded that it is a detritus bottom feeder. George (1974) studying the food of juveniles of *M. monoceros*, a closely related species to *M. kutchensis*, found that it is a carnivorous feeder with preference to small crustaceans like amphipods, mysids, tanaidacea, copepods and decapod larvae. The present study on *M. kutchensis* although restricted to a short season indicates that it is an omnivore with possible preference to crustaceans and algae.

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