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NATIONAL SYMPOSIUM ON RESEARCH AND DEVELOPMENT IN MARINE FISHERIES

MANDAPAM CAMP

16-18 September 1987

Papers Presented
Sessions V, VI & VII

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
(Indian Council of Agricultural Research)
P. B. No. 2704, E. R. G. Road, Cochin-682 031, India

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THE STATUS OF PRAWN FISHERY AT JAKHAU, GUJARAT

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ABSTRACT

During the past one decade, Jakhau has become an important seasonal (September to March) fishing centre in Kutch, attracting an increasing number of fishermen and traders from different parts of Gujarat. The prawn fishery contributed 24% of the total trawl landings during the 1985-86 season. The prawn fishery is chiefly supported by penaeids like *Penaeus monodon*, *P. indicus*, *P. semisulcatus*, *Metapenaeus brevicornis*, *M. kutchensis*, and non penaeids like *Hippolytina ensirostris* and *Exopalaemon styliferus*. The peak season for the fishery is from October to January. The average catch per unit effort for prawns showed a clear decline during 1985-86 and 1986-87 seasons. This is apparently attributed to the fact that increasing number of migrant fishermen come here to fish, leading to overfishing. Management measures, that should be taken to conserve the stock in these fishing grounds are suggested.

INTRODUCTION

Jakhau (23° 14.5' N and 68° 36.5' E) is an important seasonal (September to March) fishing centre in Kachch district of Gujarat. However, there is no information available on the status of fisheries of this area. Studies made so far include a general survey of the prawn fishery of the Saurashtra (Srivatsa, 1953), economic value of prawn fishing industry (Lacumb, 1960), occurrence of *Metapenaeus kutchensis* in the Gulf of Kachchh (George *et al.*, 1963), distribution of prawn species in the coastal waters of Kachchh (Ramamurthy, 1963, 1964, 1967), study of prawn grounds in the north-western division of India (Virabhadra Rao and Dorairaj, 1966), and observation on total prawn catch of Saurashtra coast (Kagwade, 1967). More recently observations on prawn fishery in the Gulf of Kachchh (Deshmukh, 1975), studies on the fishery at Sukhpur and Lakhpat areas in Kachchh (Sarvaiya, 1978) and a survey of the prawn resources within the exclusive economic zone of the north west (including Kachchh) coast of India (Bapat *et al.* 1982) have been reported.

As a part of our research programme to evaluate the anthropogenic pressure on the natural resources of the Gulf of Kachchh, we examined in some detail the prawn fishery at Jakhau. The present paper analyses prawn catches landed by trawlers, and suggests management measures aimed towards optimum utilization of the stock in these fishing grounds.

MATERIAL AND METHODS

Fishing, particularly prawn fishing, in Jakhau waters was studied. Simultaneously, anthropogenic pressure on mangroves and the existing fishing facilities about the fishery and status of mangroves in the vicinity was gathered by interviewing fishermen during our frequent visits to the site. Total catch for each season was estimated from the data obtained from Department of Fisheries, Govt. of Gujarat. Effort data in terms of number of boats operating, were obtained from the Port Office, Jakhau. Additional data, namely, fishing schedule, location of fishing grounds, quality of catch and expenses incurred in fishing, were obtained by interviewing about 10% of the fishermen at Jakhau during 1985-86 and 1986-87 seasons. The rainfall data was obtained in Nailya, which is 26 km north of Jakhau. Effort is defined as the number of boats operating in season. Catch per unit effort (c.p.u.e) is the catch by one vessel in unit time (1 trip).

RESULTS

Historical background

Traditional fisheries exploiting the prawn and fish stock, with bag-nets, hooks and lines and other gear have existed for a long time. The trawl fishery began in 1978 with the arrival of trawlers from Kotda, Madhwa, Veraval, Porbander, Salaya, Sikka and Sachana (Fig.1). In later years fishermen from other places also started camping at Jakhau.

Today, the fishery at Jakhau is largely seasonal and mainly carried out by migrant fishermen. The trawlers mainly catch prawns by using trawl nets while the OBM (out board motor fitted boats) mainly catch fish like Bombay duck, sharks and rays, by using large bag-nets and gill-nets.

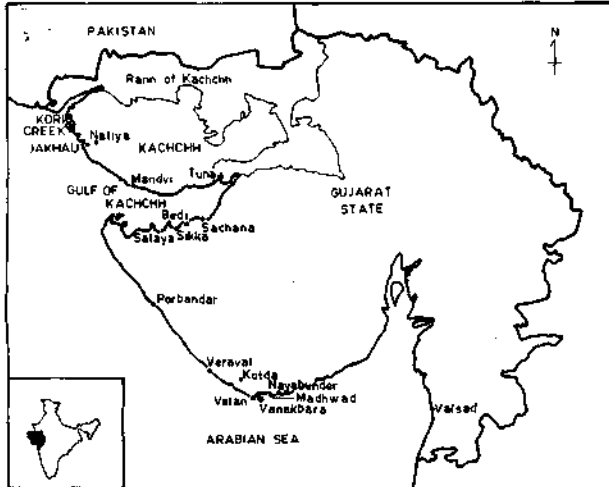


Fig. 1. Map of Gujarat showing location of places from which migrant fishermen come to Jakhau for fishing.

Migrant fishermen

The migrant fishermen from the different stations come to Jakhau and camp there, from September to March. During the 1986-87 season, the proportion of trawlers of migrant fishermen of different place that operated from Jakhau are illustrated in Fig 2. The percentage of migratory OBM operated from Jakhau for the same season are shown in Fig.3.

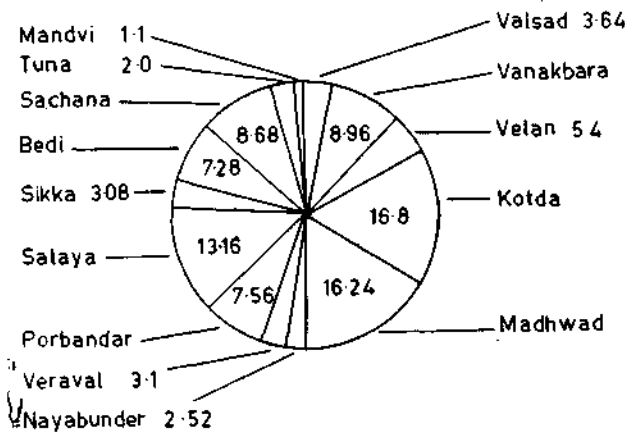


Fig. 2. Stationwise proportion in percentage, of migrant trawlers at Jakhau.

Resident fishermen

The total resident fishermen population at Jakhau is 330, of which 150 are active fishermen. They have only 14 non-mechanised boats which operate during the lean season (April to August) so that most of the fishermen go on foot for fishing using traditional gear. In the peak season when the migrant fishermen arrive, most of the resident fishermen work as sailors cum helpers on the trawlers. A few of them are engaged by the fish traders who also come and camp at Jakhau during the fishing season, to sort and pack the catch. Some of the villagers of Jakhau who at other times do farming, set up their shops such as tea stalls and barber shops, during the fishing season and have some additional income.

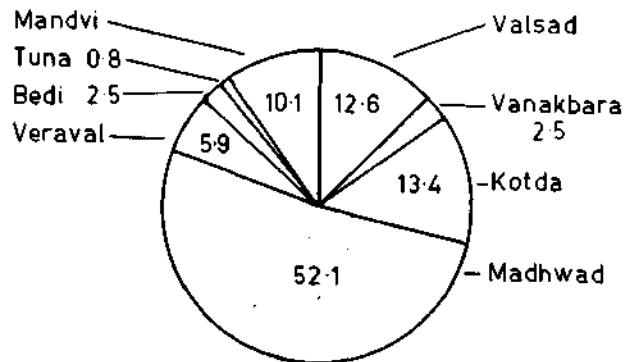


Fig. 3. Stationwise proportion, in percentage, of OBM boats to Jakhau.

Fishery

The trawlers varying in length from about 12 to 14 m, fitted with 102 HP engines and equipped with otter trawls with head rope length varying from 5 to 6 m and with cod end stretched mesh of 2 cm are operated in this region, mostly within 6-8 fathoms. The boats generally go in pairs for 4 to 6 days fishing. They make 5 to 6 trips in a month, with an average of 180 fishing hours per month per boat. For each trip, approximately 25 to 40 kg of wood from mangroves *Avicennia marine*, and terrestrial plants *Acacia sp* and *Prosopis juliflora* is cut from nearby sources and utilised as fuel for cooking. During each trip 8 to 10 slabs (a slab of 140 kgs) of ice are also carried along. Fishing during a trip is carried out day and night off the west coast of Kachchh, extending for about 64 kms from Jakhau. The prawns are decapitated on board and preserved in ice. On landing the catch at Jakhau, the prawns are sorted into the 4 sale groups and sold directly to the prawn traders.

Prawn species

About 10 species of prawns are caught and grouped into 4 groups for sale, in decreasing order of size and price as follow: (1) Jumbo *Penaeus monodon*, *P.indicus*, and *P.merguensis*, (2) medium white-*Metapenaeus brevicornis*, *M.kutchensis* and small individuals of *Penaeus indicus*, (3) medium brown - *Parapenaeopsis hardwickii*, *Metapenaeus monoceros* and small individuals of the large species, and (4) tiny-*Exopalemon styliferus*, *Hippolysmata ensirostris* and *Parapenaeopsis stylifera*.

During the 1986-87 season, the proportion of different groups in a trawl catch was jumbo-15.5%, medium white - 2.93%, medium brown-33.31% and tiny - 48.25.0% The number of individuals per unit weight for each group was as follows : jumbo - 70 to 90, medium white - 160 to 200, medium brown - 160 to 200 and tiny -200 to 400.

Prawn catch statistics

Among 37 fishing centres in the Kachchh district, Jakhau is the most important one. Out of average catch of about 17,834 tonnes per annum of fin fish and prawns landed in Kachchh as a whole, during 1978 to 1987, about 4126 tonnes were landed at Jakhau. In the annual catch landed, proportion of prawns was about 25% at Jakhau as compared to about 17% for the Kachchh district as a whole (Table 1). Consequently, Jakhau contributed about 31% of 2364 tonnes of prawns landed annually in the Kachchh district (Table 2). This illustrates the importance of Jakhau in the prawn fishery of Kachchh.

Prawn fishery at Jakhau seemed to have passed through three phases during the period from 1978 - 1989 (Fig. 4 ; Table 3) as follows:

1978-1983. During this period, the number of trawlers operating in different years varied but little. Total prawn catch and c.p.u.e. stagnated more or less at about the same level until 1981-82 season, but there was a dramatic spurt in the total catch as well as c.p.u.e. during the 1982-83 season.

1983-85. Apparently attracted by high c.p.u.e. in 1982-83 season, an increasing number of trawlers started operating from Jakhau year after year starting from 1983-84 season. From 1983-84 to 1984-85 season there was a progressive increase in the total catch as well as c.p.u.e.

1985-1987. During 1985-86 and 1986-87 seasons increase in the number of trawlers continued, but c.p.u.e. progressively declined.

There is no significant correlation between the annual rainfall recorded at Naliya and c.p.u.e. (Table 3) at Jakhau. Table 4 shows that in an annual catch proportion of sale groups jumbo, medium brown and tiny varied in different years, but on the average they constituted 27%, 38%, and 33% respectively, medium white which fetches higher price than the medium brown (Table 5) constituted only about 2% of the catch.

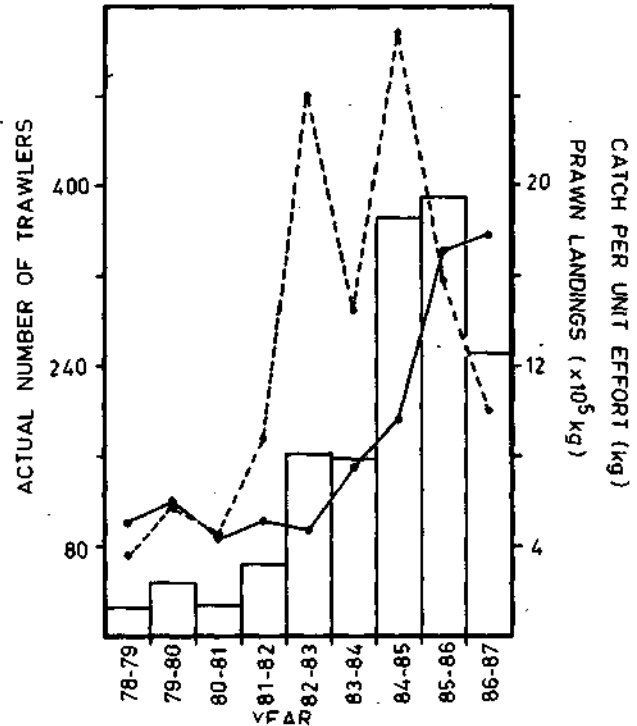


Fig. 4. Total prawn catch (histogram), number of trawlers operating (solid line) and the c.p.u.e. (broken line) in different seasons at Jakhau.

Infrastructure

Infrastructure for fishery at Jakhau is highly inadequate. (1) Jetty at Jakhau port has faulty construction and is unusable for docking boats; it has been so designed that the trawlers during low tide slide underneath it and sustain damages. (2) There is no proper water supply at the port, so that the fishermen are forced to purchase water throughout the season from the wells of an agricultural community about 12 kms inland. (3) Though there is electricity at the port, no electric connections are ever given to the fishermen, so

Table 1. *Jakhau catch in comparison to Kachchh as a whole.*

Period	Kachchh district total catch (tonnes)	Percentage		Jakhau total catch (tonnes)	Percentage	
		Fish	Prawn		Fish	Prawn
1978-79	6226.8	83.2	16.8	1757.6	92.2	7.8
1979-80	5658.1	83.9	16.1	2233.6	88.9	11.1
1980-81	4108.6	69.0	31.0	450.9	68.8	31.2
1981-82	6334.3	76.0	24.0	579.5	43.8	56.2
1982-83	13784.6	84.2	15.8	2762.9	70.5	29.5
1983-84	23314.5	86.2	13.8	3399.1	76.9	23.1
1984-85	34288.0	86.3	13.7	6396.2	70.5	29.1
1985-86	35477.0	88.5	11.5	8366.3	76.6	23.4
1986-87	31314.0	92.6	7.4	1187.6	88.7	11.3
Average	17833.99	88.32	16.68	4125.97	75.21	24.74

Table 2. *Percentage contribution of Jakhau fishery to the prawn catch in Kachchh*

Period	Kachchh district prawns (tonnes)	Jakhau %
1978-79	1049.6	13.0
1979-80	916.1	26.9
1980-81	1277.5	11.0
1981-82	1522.9	21.0
1982-83	2184.8	37.2
1983-84	3232.5	24.2
1984-85	4690.0	39.6
1985-86	4085.0	47.8
1986-87	2320.9	54.5
Average	2364.37	30.58

Table 3. Summary of year-wise prawn catch at Jakhau

Period	Number of trawlers	Prawn catch (tonnes)	Catch per unit effort (kgs.)	Rainfall (mm)
1978-79	105	136.6	36.15	505
1979-80	120	247.3	57.25	925
1980-81	87	140.6	44.91	550
1981-82	103	325.9	87.91	741
1982-83	94	814.2	240.61	309
1983-84	150	784.3	145.24	389
1984-85	193	1860.8	267.82	228
1985-86	343	1955.9	158.40	132
1986-87	357	1266.4	98.53	222
Average	172.44	836.89	126.31	444.56

Table 4. Proportion of different sale groups in the Jakhau Prawn catch

Period	Prawn catch at Jakhau (tonnes)	Percentage			
		Jumbo	medium white	medium brown	tiny
1984-85	1860.8	32.14	1.07	27.85	38.92
1985-86	1955.9	33.58	1.82	52.73	11.85
1986-87	1266.4	15.50	2.93	33.31	48.25
Average	1694.4	27.07	1.94	37.96	33.00

Table 5. Cost and net gain of trawlers

Period	Expenses incurred per trip (Rs.)	Selling price of prawn per kg (Rs.)				Net profit per trip
		jumbo	medium white	medium brown	tiny	
1984-85	1408	40	25	20	8	4431.74
1985-86	1577	55	30	25	12	3753.85
1986-87	1843	60	35	30	15	871.70
Average	1609.33	51.66	30.66	25.0	11.66	3016.09

that they have to use lanterns and carry out unloading and sorting of the catch under poor light at night.(4) The dirt road from Jakhau village to the port (12 km) is a rough unfinished one making the transportation difficult and time consuming. (5) Two private dispensaries are set up, during the season, but they charge exorbitant fees for medication, as the government health services are not extended to Jakhau.

Mangroves

There is a luxuriant growth of mangroves north of Jakhau. Because of the arid climate and proximity of the international border with Pakistan, this part of the coast is sparsely populated and unlike many other places in the Gulf of Kachchh, the anthropogenic pressure on the mangroves is not severe. The cutting of mangroves is carried out mainly by fishermen while they are on fishing trip.

DISCUSSION

Proximity of mangroves to fishing ground is favourable for prawn fishery, since the relation between prawn recruitment and mangrove area appears to be logarithmic (FAO, 1980). Mangroves are considered as nursery grounds since many species of penaeid prawns spend the early months of their life in shallow inshore waters. The juveniles feed on the algae, minute organisms and organic detritus (Panikkar, 1952) which are readily available in the mangrove ecosystem. It seems possible that the large catch of prawns in

Jakhau waters could be attributed to the good growth of mangroves. Another factor contributing to the large catch landed here could be the pollution free waters, since there are no industries or big ports on this part of the coast.

There is considerable reduction in the mangrove vegetation in the greater part of Gulf of Kachchh due to grazing by camels and cutting of the wood by the fishermen for fuel. Before large scale destruction of mangroves spreads to Jakhau, preventive measures should be taken to stop the cutting down of mangroves by providing an alternate source of fuel to the coastal people. Simultaneously, the existing mangroves can be augmented by planting new ones.

It is often reported that the rainfall increases the prawn catch in a particular area (Ramamurthy, 1967). Qasim (1972) observed that during monsoon enrichment of coastal waters takes place due to upwelling, by which bottom waters from great depths are brought to the surfaces. The upwelled water is very rich in nutrients but has very little dissolved oxygen, and since it comes very close to the shore, has a profound influence on the prawn population. However, the rainfall data recorded at Naliya does not show any relation to the catch landed at Jakhau. A possible explanation is that the catchment areas of rivers opening near about Jakhau, and the Rann of Kachchh from which the rain water is eventually drained by Kori Creek being far away from Naliya, the fresh water discharge on the Jakhau coast is not approximated by rainfall recorded at Naliya.

Table 6. *Statement of expenditure incurred per boat per fishing trip at Jakhau*

Description of expenditure	1984-85 expenses (Rs.)	1985-86 expenses (Rs.)	1986-87 expenses (Rs.)	Average
Diesel	725	800	963	289.33
Ice	208	240	280	242.67
Salary for crew	275	300	325	300.00
Provisions	150	175	200	175.00
Tobacco/Beedies	10	12	15	12.33
Water	5	10	10	8.33
Repairs	35	40	50	41.67
Total	1408	1577	1843	1609.33

Analysis of the costs and earnings (Table 5 & 6) of the average prawn trawler showed that even with the present heavy fishing, the operation is profitable. The fishery is therefore not at the moment in economic difficulty, though vulnerable to changes in prices of fuel or prawns and environmental factors like drought which may affect the cost of commodities, such as, ice and water. The net income benefit was sufficient for the 1986-87 season, but in comparison to the two previous seasons there is a substantial drop in profits. Fishing at the level estimated to give a maximum yield of prawns (343 boats/season, 1985-86 yielding 1955.9 tonnes) would give a net return (value of catch less costs) of about 46 million rupees. Slightly higher economic returns per trawler could result from a fishing effort less than that giving the maximum catch. However, a drastic reduction in the effort would lead to great reduction in the catch, thus causing unemployment to many fishermen and the women (approximately 500/season) who are brought every season from places like Vanakbara, Diu and Kodinar, to sort and pack the catch. An intermediate level of effort, of around 200 to 250 boats per season would seem an acceptable compromise between high catch, high employment and high economic returns for the continued sustenance of the stock at optimum harvesting levels. This can be regulated by initiating the resident fishermen to take active part in fishing.

Profit in fishing can also be increased by a decrease in cost of fishing by improving facilities like construction of a tar road from the jetty to the Jakhau village for quick transport of the catch, supplying water to fishermen through tankers during the fishing season, providing cold storage facilities at the jetty and by installing a government mobile hospital to deal with the various health hazards faced by the fishermen.

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