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MAGNITUDE OF LOBSTER RESOURCES OF INDIA*

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ABSTRACT

Lobsters inhabit our tropical waters in different concentrations in some parts of our coasts. The average annual catch of lobsters during the 10 year period of 1975-84 was 1763 tonnes forming 0.82% among the crustaceans and 0.12% in the total marine fish landings. Of these 73.56% was from Gujarat and Maharashtra and 19.45% from Tamil Nadu. Of the 6 species of spiny lobsters recorded, only 3 of them and one species of slipper lobster support the fishery of this country. The catches of *Panulirus polyphagus* and *Thenus orientalis* were substantial forming about 46.71% and 46.44% respectively. The catch of *Panulirus homarus* was poor contributing to only 5.89% while that of *Panulirus ornatus* was almost negligible, being 0.96%.

The magnitude of the catch for *P. homarus* and *P. ornatus* is so small that they should not be exploited more than the existing rate from the present fishing grounds. Either new grounds have to be found or the population should be raised by culture practices to meet the demand of the market.

INTRODUCTION

LOBSTERS are valued as one of the prime sea foods all over the world. They stand only next to prawns among the crustaceans in their commercial value in spite of supporting a minor fishery of small magnitude and have an appreciably good export market earning lucrative foreign exchange.

Lobsters around the Indian Coast are tropical species andare classified as warm water species. They are of 2 kinds, namely the spiny or rock lobster belonging to the family Palinuridae and the flat or slipper lobsters belonging to the family Scyllaridae. Tropical waters are known to be less productive of lobsters than the temperate ones, but are found to be richer in species. They are mostly gregarious in habit. Prasad (1986) reported 7 species of spiny lobsters under the family Palinuridae that are common to Indian waters. He also mentioned that out of these 7, *viz. Puerulus sewelli* and one more species of *Palinustus mossambicus* are the 2 deep water forms occurring in large quantities in the deeper waters of the Southwest coast of India.

There are 6 species of spiny lobsters and only one of slipper lobster of commercial importance in India. They inhabit the shallow coastal waters in the rocky or muddy areas in various concentrations. In spite of many species appearing in the fishery, only one or two species either contribute or stand out from others in the catch at different regions of this country.

The 6 species of spiny lobsters of commercial importance are *Panulirus polyphagus* (Herbst), *Panulirus homarus* (Linnaeus), *Panulirus ornatus* (Fabricius), *Panulirus versicolor* (Latreille),

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Panulirus longipes (Milne-Edwards) and *Panulirus penicillatus* (Olivier).

The only one species of slipper, also known as sand lobster is *Thenus orientalis* (Lund).

These lobsters are caught indigenously by baited traps, bottom set gill nets, bag nets and manually operated drag nets. They are also landed in larger quantities by trawlers.

CATCH

Data used in this paper belong to Central Marine Fisheries Research Institute. The annual catch of lobsters (Fig. 1) in India during the 10 year period 1975-'84 varied between 679 t in 1980 and 3,222 t in 1984 giving an average annual catch of 1,763 t. Its annual percentage catch in the total crustaceans ranged between 0.34 and 1.34 in 1980 and 1976 respectively giving an average annual catch of 0.82%. Its annual percentage catch in the all fish catch of the country varied between 0.50 in 1980 and 0.21 in 1976 forming an average annual catch of 0.12%.

The state-wise distribution of lobsters as judged from the average annual catch (Fig. 2) for the 10 year period 1975-84, indicated that Gujarat landed the maximum of 813 t forming 46.11% of the lobster catch. Next to that was Maharashtra with 484 t forming 27.45%. These two states together from the northwest coasts contributed about 73.56% to the total lobster catch. Next was Tamil Nadu from the southeast coast, with an average annual catch of 343 t forming 19.45% of the lobster catch. Kerala recorded an average annual catch of 47 t forming 2.67%. This was followed by Karnataka and Andhra Pradesh with an average annual catch of 24 tonnes and 1.36% in the former and 21 tonnes and 1.19% in the latter. Pondicherry, Goa and Orissa recorded poor catches with average annual catches of 16 t forming 0.91%, 10 t forming 0.57% and 4 t forming 0.23% respectively. Andamans had only one tonne as the average annual catch

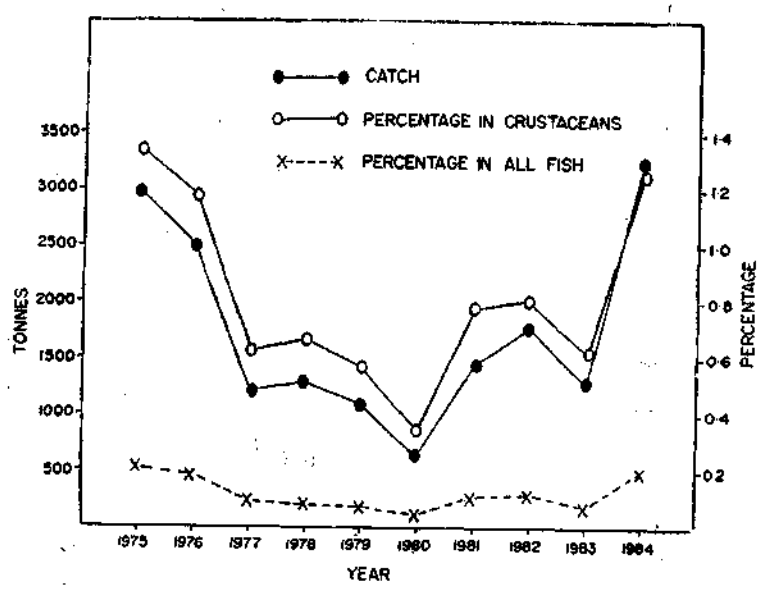

Fig. 1. Annual landing of lobsters during 1975-84 in India.

forming 0.06%. West Bengal and Lakshadweep did not record any lobster in their catches.

A project on 'The Assessment of lobster resources' was initiated by the Central Marine Fisheries Research Institute in 1978 at 6 selected centres, *viz.* Veraval, Bombay, Calicut, Cochin (analysis of lobster data from Kanyakumari Coast, Tamil Nadu), Tuticorin and Madras to study this group in detail.

observation at all the centres was estimated at 881 tonnes. Bombay contributed the maximum of 402 t at the rate of 9.46 kg/U and formed 45.63%. Next to it came Veraval with the average annual catch of 270 t at the rate of 3.02 kg/U and formed 30.65%. These two together formed 76.28% of the lobster landings. However, Bombay recorded higher catch than Veraval though in all India level Gujarat landed more than Maharashtra. Third in the

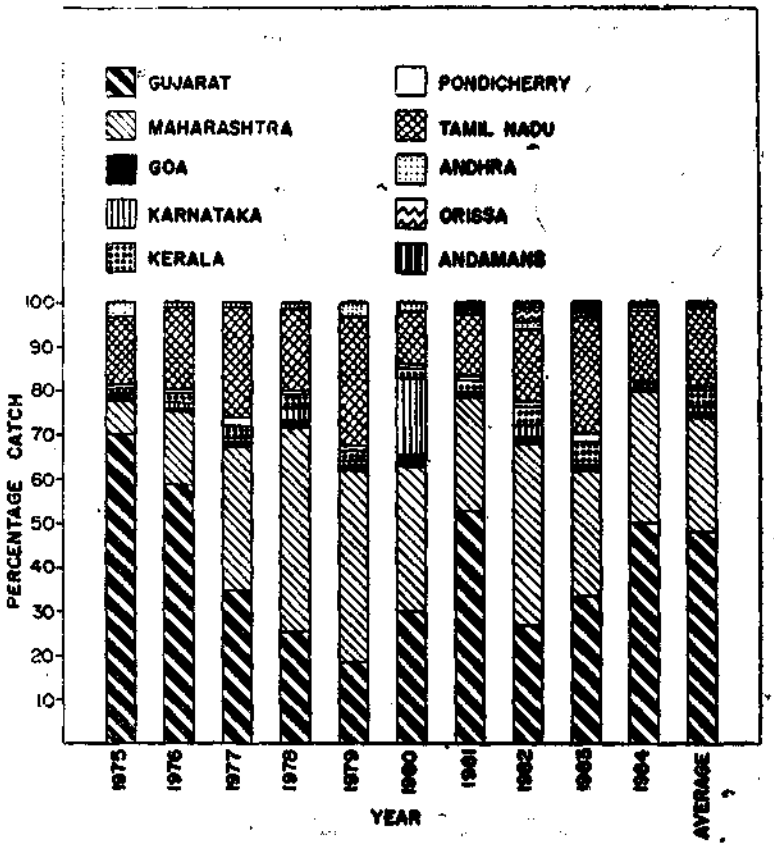

Fig. 2. Annual State-wise landings of lobsters in percentage during 1975-84.

Table 1 gives the details of fishing at these 6 centres. The number of years of observation at these places varied from 3 to 8. Since the gear operated were more than one at Kanyakumari Coast and Madras, the catch per unit effort was not taken for these 2 centres. The average annual total catch of lobsters during the period of

rank was Madras with an average annual catch of 109 tonnes forming 12.37% followed by Kanyakumari Coast which recorded an average annual catch of 80 t forming 9.08%. Tuticorin landed an average annual catch of 12 t at the rate of 4.39 kg/U and formed 1.36%. Of all lobsters Calicut was the poorest with an

average annual catch of only 8 t forming a poor 0.91%, but its catch rate of 4.54 kg/U was good and was next only to that in Bombay.

Species Composition

Of the 6 species of spiny lobsters, *P. polyphagus*, *P. homarus* and *P. ornatus* were the only 3 species which formed the mainstay of the commercial fishery. *P. versicolor* was poorly represented in the catch. At some places, the slipper lobster *T. orientalis* also contributed substantially to the fishery. *P. longipes* and *P. penicillatus* contributed very little to the fishery.

The distribution of these species and also their commercial abundance were specific to regions in most of the cases. The species contributing to the fishery were *P. polyphagus* and *T. orientalis* at Veraval and Bombay, *P. homarus* and *P. polyphagus* at Calicut, *P. homarus*, *P. ornatus* and *P. versicolor* from Kanyakumari District, *P. homarus* and *P. ornatus* at Tuticorin and *P. homarus*, *P. polyphagus*, *P. ornatus* and *T. orientalis* at Madras.

P. polyphagus: The maximum average annual catch of this species for the 8 year period 1978-'85 was at Bombay. It was 217.5 t at the rate of 5.11 kg/U and formed 54.04% of the lobster catch. At Veraval the average annual catch for 6 years period 1980-'85 was 121.7 t at the rate of 1.36 kg/U and formed 45.09% of the lobster catch. *P. polyphagus* at Calicut gave an average annual catch of 1.7 t at the rate of 1.03 kg/U and formed 22.69% of the lobster landings during the 3 year period, 1982-83, 1983-84 and 1985-86. The same species at Madras was poorly represented in the fishery and its average annual catch for 7 year period 1978-84 was only 0.4 t forming 3.63% of the lobster landings.

Table 1. *Average annual catch of lobsters at Project centres during* 1978-84

Centres	Period	No. of years	Annual average			
			Units	Catch (t)	%	Kg/Unit
Veraval ..	1980-85	6	89,433	270	30.65	3.02
Bombay ..	1978-85	8	42,528	402	45.63	9.46
Calicut ..	1982-84 & 1985-86	3	1,675	8	0.91	4.54
Kanyakumari Coast ..	1978-80	3	—	80	9.08	—
Tuticorin ..	1978-85	8	22,533	12	1.36	4.39
Madras ..	1978-84	7		109	12.37	—
All Centres ..				881		

P. homarus: The best fishery for *P. homarus* was at Cochin where the catch from Kanyakumari district was recorded. The average annual catch for the 3 year period 1978 to 1980 for this species was 24.7 t forming 92.14% of the lobster catch. Next came Tuticorin with an average annual catch of 8 t for the 8 year period 1978-1985 at the rate of 2.84 kg/U and 64.67%. Calicut recorded an average annual catch of 5.9 t at the raet of 3.51 kg/U for the 3 year period 1982-83, 1983-84 and 1985-86 and formed 77.31% of the lobster landings. The average annual

catch at Madras was 4.7 t forming 43.04% during the 7 year period 1978-1984.

P. ornatus : The fishery for *P. ornatus* was the best at Tuticorin. The average annual catch for the 8 year period 1978-1985 was 4.4 t at the rate of 1.55 kg/U and formed 35.33% of the lobster catch. Kanyakumari Coast recorded a catch of 2.1 t forming 7.8% as the average annual catch during the 3 year period 1978 to 1980. Madras had the poorest with 0.2 t forming 1.92% as the average annual catch for the 7 year period 1978-1984

P. versicolor : This species was very poorly represented. Poor catch of 0.02 t forming 0.06% as the average annual catch was recorded during the 3 year period 1978-'80, at Kanyakumari Coast.

T. orientalis : This is the only species of slipper lobster occurring in the fishery and has very good fishery at Bombay and Veraval. The average annual catch at the former centre was 184.9 t at the rate of 4.35 kg/U forming 45.96% during the 8 year period 1978 to 1985 and the same at the latter was 148.3 t at the rate of 1.66 kg/U forming 54.91% during the 6 year period 1980-1985. At Madras the average annual catch for this species during the 7 year period 1978-1984 was only 5.6 t forming 51.05% of the lobster catch.

Seasonal Variations

P. polyphagus : The monthly average annual catches at different centres showed that *P. polyphagus* which was available all round the year contributed the best to the fishery from October to January in Bombay (Table 2) and from November to January in Veraval landing 35.6 t (14.84%) to 41 t (17.10%) at the former and 10.4 t (17.42 %) to 12 t (19.7%) at the latter. The catch was the poorest during the monsoon months of June to August at Bombay recording the catch of 5.8 t (2.44%) to 10 t (4.15%). At Veraval there was no catch during July and August due to paucity of fishing while in June it was negligible forming only 0.1 t (0.12%).

The season for this species was not well demarcated at Calicut. It was available throughout in small quantities. The maximum of 0.7 t forming 43.16% was in September. There was no catch from June to August due to monsoon. The catch at Madras was poor throughout. August and September recorded slightly better catch of 0.14 t and 0.17 t forming 35.52% and 43.83% respectively. In rest of the months, the catch was 0.02 t or less.

P. homarus : The fishery for *P. homarus* (Table 3) was all round the year at Tuticorin and Madras along the east coast, while it was not so during the monsoon period of June to September at Kanyakumari Coast and Calicut along the west coast. At Kanyakumari Coast the catches of this species were very high in October with 6.9t (28.01%) and in January with 5.2 t (21.18%). In other months the catches ranged between 0.6t (2.56%) in May and 3.2 t (12.84%) in April. The fishery for this species though was throughout the year at Tuticorin the catch showed marginal fluctuations between 0.5 t (6.8%) in April and 1.2 t (15.54%) in November. The catches during June, July and August were extremely poor (0.2 - 0.3 t and 2.79% - 3.15%). The catch at Calicut was poor throughout. Slightly better catch was noted between October and February with the catches ranging between 0.6 t (10.87%) in December and 1.3 t (21.95%) in February. In other months the catch was negligible. At Madras too, *P. homarus* was poorly represented. The period was slightly better between January and May during which the catches ranged between 0.9 t (19.10%) and 0.4 t (8.88%). During the rest of the months the catches were between 0.01 t (0.15%) and 0.3 t (6.64%).

P. ornatus : At Tuticorin the fishery for this species was present all round the year showing

only marginal fluctuations (Table 4) ranging between 0.3 t (6.5%) in January and 0.5 t (11.50%) in November. The catches were slightly better during April, May and October to December. *P. ornatus* did not contribute to the fishery at Kanyakumari Coast during the monsoon period of June to September. The catch during different months ranged between 0.01 t (0.33%)in November and 0.8 t (36.63%) in March. At Madras this species was negligible though present almost throughout the year, the maximum catch being only 0.06 t (29.19%) in May.

T. orientalis : At Bombay *T. orientalis* appeared in the catch all round the year. The peak landing was in June when the landing were 37.2 t (16.41%) and the next highest was in September when the catch was 26.9 t (11.85%). March recorded the poorest yield with 7.9 t (3.49%). In the other months the catch fluctuated between 12.7 t (5.71%) and 21.4 t (11.85%). At Veraval there was no fishing in the monsoon from June to August. The fishery was better during postmonsoon period and poorer during premonsoon period. The peak landings were during December and January when the average annual catch was 25.6 t (34.57%) for the former and 17.3 t (23.3%) for the latter. During the other months the catches fluctuated between 0.3 t (0.45%) and 9.5 t (12.89%) (Table 5). At Madras the fishery for *T. orientalis* occurred throughout the year. Maximum catch of 1.0 t (16.60%) was in August while the minimum of 0.1 t (1.31%) was in May. In the other months the catches fluctuated between 0.2 t (3.76%) and 0.7 (11.93%).

Discussion

The average annual catch of 1,763 tonnes of lobsters represented by the 4 species *P. polyphagus*, *P. homarus*, *P. ornatus* and *T. orientalis* is too small a fishery for this country with a vast coast line. The over enthusiasm to exploit more to earn foreign exchange should not harm the sparsely spread stocks. The increase in the catch of *P. polyphagus* and *T. orientalis* at Veraval and Bombay and of *T. orientalis* at Madras is due to trawlers fishing upto about 70 metres. Both these species inhabit muddy deeper bottoms. *P. homarus* which appeared in the trawl fisheries at Madras in some quantity in the early years till 1982, hardly contributed to the catch from 1983 onwards. Berry (1971) mentioned that *P. homarus* inhabits highly turbid waters and is tolerant of coarse sand particles churned up and held in suspension by the surf which breaks continuously in the shallow waters. Probably for this reason this species does not occur much in the trawling grounds which are found to be muddy. *P. ornatus* is another species which though captured in small quantities at Madras by the bottom set gill nets, does not appear in the trawl catch. So also is the case with *P. versicolor*.

The biology of *P. polyphagus* with respect to growth (Radhakrishnan and Devarajan, 1986; Kagwade, 1986, MSS 1 and 2), maturation and spawning (Kagwade, 1987, MS 1) and fecundity (Kagwade, 1987, MS 2) have been studied. However, due to dearth of specimens on account of the prevailing small fisheries not much could be contributed to the biology of *P. homarus* and *P. ornatus* from the Indian waters. Some of the observations made at the research centres indicate that ovigerous females in *P. homarus* are encountered throughout the year as in the case with *P. polyphagus*. It is astonishing to note that during the long period of 8 years study at Tuticorin where *P. ornatus* forms a small fishery, not a single ovigerous specimen was encountered in spite of the wide range of 115-415 mm representing the catch indicating absence of spawning population in the fishing grounds. The catch being very small, the seasonal fluctuations are not well defined. The spawners may be moving away in batches from the trawling grounds and spending

TABLE 2. *Average monthly catch in tonnes (% in parentheses) of* Panulirus polyphagus *at 4 Project centres during* 1978-86

Centre	No. of years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Bombay ..	8	41.0 (17.10)	17.1 (7.12)	15.9 (6.63)	20.1 (8.38)	21.1 (8.8)	7.2 (2.99)	5.8 (2.44)	10.0 (4.15)	17.5 (7.29)	35.6 (14.84)	15.4 (6.44)	33.2 (13.82)	240.0
Veraval ..	6	10.4 (17.12)	5.1 (8.43)	6.5 (10.66)	6.3 (10.38)	2.9 (4.71)	0.1 (0.12)	—	—	0.6 (0.96)	5.3 (8.68)	11.7 (19.18)	12.0 (19.76)	60.9
Calicut ..	3	0.2 (12.17)	0.1 (6.72)	0.07 (3.94)	0.05 (3.01)	0.2 (9.04)	—	—	—	0.7 (43.16)	0.2 (9.33)	0.2 (9.91)	0.05 (2.72)	1.7
Madras ..	7	0.009 (2.27)	0.017 (4.28)	0.014 (3.53)	0.02 (5.29)	0.009 (2.27)	0.003 (0.75)	0.004 (1.01)	0.14 (35.52)	0.17 (43.83)	0.003 (0.75)	0	0.002 (0.50)	0.4

TABLE 3. *Average monthly catch in tonnes (% in parentheses) of* Panulirus homarus *at 4 Project centres during* 1978-86

Centre	No. of years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Kanyakumari ..	3	5.2 (21.18)	2.5 (10.19)	2.8 (11.19)	3.2 (12.84)	0.6 (2.56)	—	—	—	—	6.9 (28.01)	1.6 (6.22)	1.9 (7.81)	24.7
Tuticorin ..	8	1.0 (12.03)	0.8 (9.72)	0.7 (9.39)	0.5 (6.80)	0.6 (7.01)	0.3 (3.60)	0.2 (2.79)	0.3 (3.15)	0.6 (7.50)	0.9 (11.85)	1.2 (15.54)	0.8 (10.62)	7.9
Calicut ..	3	1.1 (17.90)	1.3 (21.95)	0.5 (8.98)	0.3 (5.04)	0.2 (3.00)		—	—	—	0.95 (16.18)	0.94 (16.08)	0.6 (10.87)	5.9
Madras ..	7	0.5 (11.07)	0.8 (17.27)	0.9 (19.10)	0.8 (18.15)	0.4 (8.88)	0.23 (4.94)	0.22 (4.65)	0.3 (6.09)	0.31 (6.64)	0.1 (2.66)	0.01 (0.15)	0.02 (0.40)	4.7

TABLE 4. *Average monthly catch in tonnes (% in parentheses) of* Panulirus ornatus *at 3 Project centres during* 1978-85

Centre	No. of years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Tuticorin ..	8	0.28 (6.50)	0.31 (7.05)	0.39 (8.93)	0.42 (9.50)	0.47 (10.72)	0.34 (7.72)	0.28 (6.53)	0.19 (4.31)	0.27 (6.16)	0.45 (10.40)	0.50 (11.50)	0.46 (10.61)	4.4
Kanyakumari ..	3	0.13 (6.07)	0.29 /13.85)	0.77 (36.63)	0.44 (20.87)	0.13 (6.35)	—	—	—	—	0.23 (11.13)	0.01 (0.33)	0.10 (4.77)	2.1
Madras ..	8	0.01 (4.78)	0.018 (8.61)	0.02 (9.57)	0.023 (11.01)	0.06 (29.19)	0.011 (5.26)	0.02 (9.57)	0.04 (19.14)	—	0.001 (0.48)	0.001 (0.48)	0.004 (1.91)	0.21

TABLE 5. *Average monthly catch in tonnes (% in parentheses) of* Thenus orientalis *at 3 Project centres during* 1978-85

Centre	No. of years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Bombay ..	8	15.1 (6.68)	15.5 (6.83)	7.9 (3.49)	13.2 (5.81)	21.3 (9.38)	37.2 (16.41)	18.9 (8.33)	17.9 (7.90)	26.9 (11.85)	21.4 (9.44)	12.7 (5.61)	18.8 (8.27)	226.8
Veraval ..	6	17.3 (23.30)	3.2 (4.38)	6.2 (8.32)	2.6 (3.53)	1.8 (2.49)	—	—	—	0.3 (0.45)	7.5 (10.07)	9.6 (12.89)	25.6 (34.57)	74.1
Madras ..	7	0.6 (10.67)	0.5 (8.26)	0.4 (5.75)	0.2 (3.76)	0.1 (1.31)	0.3 (5.01)	0.7 (11.93)	1.0 (16.60)	0.6 (10.04)	0.6 (10.34)	0.4 (6.01)	0.6 (10.32)	6.1

sometime there to complete the incubation period for the eggs. Prasad and Tampi (1957) obtained a single ovigerous female of *P. ornatus* from Mandapam in 1955 for their studies on its larval development.

From the above it is concluded that effort should not be increased to capture more of *P. homarus* and *P. ornatus* from the present fishing grounds as the population is not dense enough. It would be appropriate to find out new grounds for these species or intensify culture practices by rearing them in captivity. Trawling may also be intensified to capture more of deep sea lobsters in view of the smaller concentration of lobsters in the shallower waters.

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