

AN APPRAISAL OF THE PRAWN FISHERY OF THE INDIAN COAST

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The elevation of India's position into the second place among the prawn fishing nations of the world is undoubtedly the result of the progressive developments that have taken place in the fishing industry during the national plan periods. Although our prawn fishery has traditionally been an occupation of the coastal fishermen using primitive crafts and gears during the early years, the gradual introduction of modern technology of fishing and fish processing during the post-independence period has enabled us to achieve this position. The insatiable demand for prawns in the world markets has also provided a fillip to the development of the necessary infrastructure at different centres to manage and maintain this multimillion rupee export trade and its ancillary industries. These developments have been made possible with the help of the vital information on the biology and dynamics of prawn resources gained through planned researches and explorations carried out

during the past 25 years. While the introduction of mechanisation into the capture fishery and the modern techniques of processing have transformed the face of the prawn industry, it has also brought in a number of problems concerning conservation and management. The increasing trend seen in the all India prawn production seem to be very reassuring, although the catch-per-unit-of-effort has declined in some of the centres causing grave apprehensions among industrialists and entrepreneurs about the sustainability of the harvest from this natural resource. Detailed research on the prawn resources is therefore an urgent need.

Prawns are distributed all along the 5,600 km. coastline of India, and their fishery accounts for over 12% of the total exploited marine living resources of the country. Of the estimated area of 500,000 km² of the continental shelf only about 112,000 km² are being exploited at present. The existing prawn

belong to the families Palaemonidae and Hippolytidae.

Systematic data on the catch statistics of prawns are available from 1950 onwards. Subject to normal fluctuations associated with the exploitation of a natural self-generating resource, the prawn catches of the country increased from 68,000 tonnes in 1960 to 160,000 tonnes in 1972 (Table 1). Thus, there

TABLE 1. Total Marine Prawn Landings in India (in tonnes)

Year	Penaeid prawns	Non-penaeid prawns	Total
1960	31759	36271	68030
1961	39083	23685	62768
1962	48251	34984	83235
1963	41071	40522	81593
1964	63389	31506	94895
1965	38085	41415	79500
1966	56146	34768	90914
1967	63310	31112	94422
1968	69467	31922	101389
1969	72133	33964	106097
1970	88857	31834	121691
1971	73320	76648	149968
1972	74268	85488	159756

has been an increase of over 135% within 13 years. This trend of increase is generally evident from the catches of all maritime states (Table 2 and 3).

The recent trends in production indicate that in Gujarat and Maharashtra, the catches of penaeid prawns show an increase and this could mainly be due to the introduction of trawlers which fish in relatively offshore waters. The decrease in non-penaeid prawn catch in Gujarat is possibly the result of a shift of fishing effort from the inshore to the offshore regions. In Maharashtra, however, the inshore fishery is very active and the non-penaeid prawn catch has increased considerably. In Goa, the penaeid prawn fishery is mostly carried out by the trawlers which have been introduced only recently and the average catch from here amounts to about 600 tonnes per year. Along the Mysore coast, the prawn fishery is mainly constituted by the penaeid prawns. Catch trends show increased production from here and the average catch is roughly 5,500 tonnes per year. Kerala coast is the most productive region for penaeid prawns with an average annual catch of over 30,000 tonnes. The catch of non-penaeid prawns is insignificant in Kerala.

Along the east coast, the penaeid prawns are more or less uniformly distributed in Tamilnadu and Andhra coasts; the average production from each of these states being more than 4,000 tonnes a year. The non-penaeid prawn catch from Andhra though not very large, is relatively better than that from Tamilnadu. Orissa and West Bengal together account for an average catch of 3,000 tonnes of penaeid prawns a year. Slight decline in the catches

TABLE 2. State-wise annual landings of Penaeid prawns (in tonnes)

Year	West Bengal & Orissa	Andhra	Tamilnadu	Kerala	Mysore	Maha-rashtra	Gujarat	Other area	Total
1960	803	1591	1872	12583	420	9278	4917	295	31759
1961	1613	2797	1819	20393	545	8166	3012	739	39083
1962	2178	1305	2526	29218	2380	8076	1497	1071	48251
1963	3776	3476	3265	21878	648	5032	1697	1299	41071
1964	2309	5224	3955	35154	561	14118	1326	742	63389
1965	2133	3507	2198	14327	778	9796	3948	1398	38085
1966	1885	2999	5136	28120	1696	9864	4094	2352	56146
1967	7801	6886	7137	27164	1260	8136	3653	1273	63310
1968	10872	5784	6159	25356	5425	11296	3221	1354	69467
1969	5638	4307	5526	34334	3980	14545	2622	1881	72133
1970	2994	5004	4724	36940	7538	28920	2653	1084	89857
1971	1679	8748	3636	31288	4635	19490	2894	950	73320
1972	1400	4866	4843	35007	5559	20112	2013	468	74268

TABLE 3. State-wise annual landings of non-penaeid prawns (in tonnes)

Year	West Bengal & Orissa	Andhra	Tamilnadu	Kerala	Mysore	Maharashtra	Gujarat	Total
1960	—	1003	275	23	—	34605	365	36271
1961	—	689	1008	43	10	21744	189	23683
1962	27	374	10	—	—	33725	848	34984
1963	17	880	101	76	—	37482	1966	40522
1964	—	1205	145	—	—	29324	832	31506
1965	—	330	82	84	—	40412	507	41415
1966	—	626	123	259	—	33312	448	34768
1967	—	2002	230	88	—	28376	416	31112
1968	—	342	734	35	1	30311	499	31922
1969	—	1757	287	34	—	31235	651	33964
1970	22	1886	540	14	1	28425	946	31834
1971	—	288	62	1519	—	74637	141	76647
1972	—	437	148	711	17	83958	218	85489

has been noticed from these regions in the past two years. The catch of non-penaeid prawns from here is insignificant.

SEASONAL DISTRIBUTION

In the commercial catches prawns occur throughout the year on both the coasts of India, but regional and seasonal preponderances in the catches caused by geographic distribution of constituting species, climatic conditions of the regions and physico-chemical changes in the eco-system are common. Generally speaking, the fishing intensity in the offshore regions extends from November to May on the west coast and from October to June on the east coast. This seasonal character of the fishery is mainly due to the result of the inability of the mechanised boats to fish during the rough seasons. This is evident from the better results of the operations of a few large vessels belonging to private agencies.

The inshore prawn fishery is active during the monsoon months on the west coast. The productive monsoon prawn fishery of Gulf of Kutch, the well-known mud-bank prawn fishery ("Chakara") of Kerala and the intensive "naran" fishery of Kanyakumari district are the special features of this period. On the South-east coast, a lucrative fishery for large size prawns exist in the summer months of June to September. In the northern sector of the east coast, the season for inshore fishery lasts from October to February.

DEPTH-WISE DISTRIBUTION OF EXPLOITED PRAWN RESOURCE

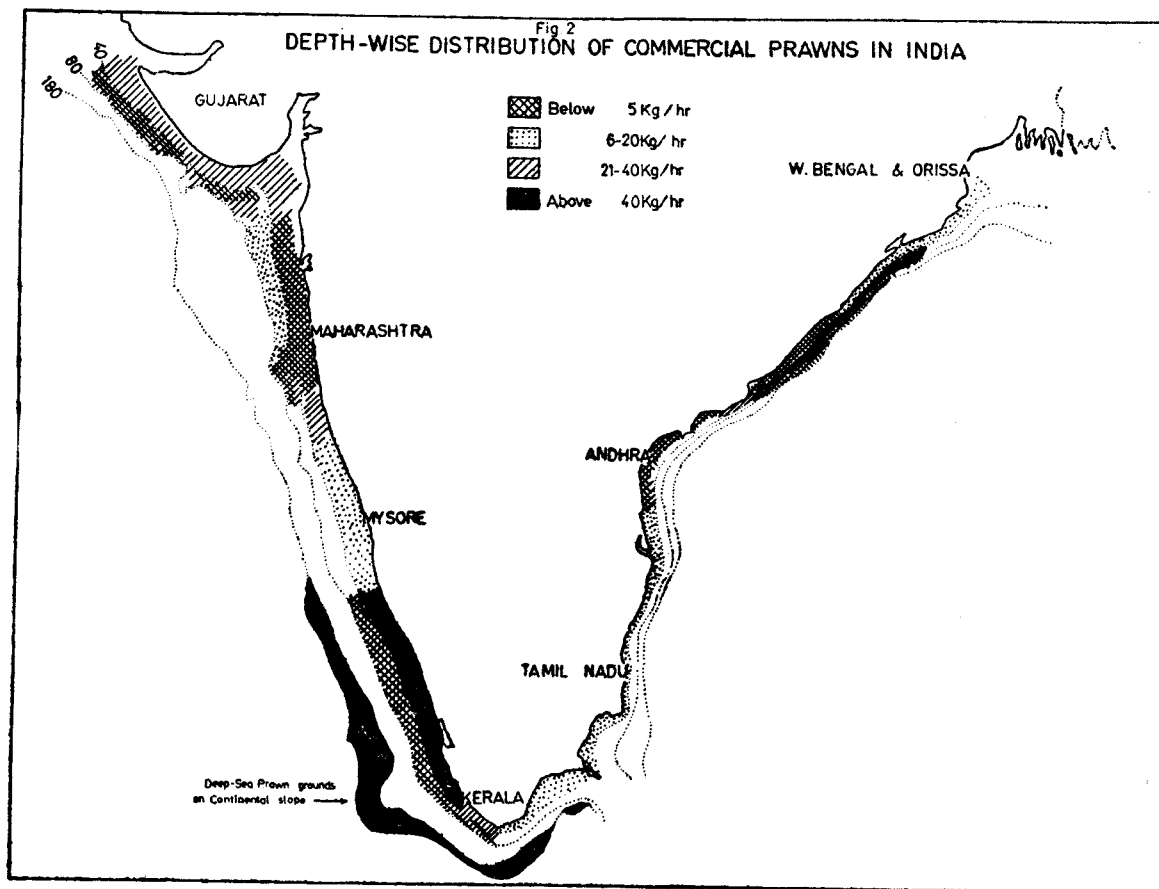
All over the country, the traditional fishery for prawns is restricted to a narrow coastal belt which extends up to about 15 meters depth zone, and is carried out by indigenous gear such as stake nets, boat-seines, shore-seines, gill nets and cast nets with the help of small non-mechanised crafts. Although the operational area of these gears is very narrow, it is estimated that over 60% of the landed prawn catch is obtained from these sources. The rest of the catch comes from the mechanised fishing fleet operating outside the above area. The catch of juvenile prawns from the estuaries, backwaters and paddy-fields, though not included in the estimates, is quite substantial.

The commercial species of prawns in our country are littoral forms having their bathymetric distribution largely confined to the inner half of the continental shelf. The information obtained from the exploratory surveys and research cruises undertaken by the different agencies and from the commercial fishing operations of the various fishing vessels indicate that they occur in commercial concentration only within 40-45 metre depth from the shore. Occasional catches of stray specimens and shoals of different species of prawns have been obtained from beyond this area too, but these catches possibly occur during their short journey into deeper waters. Such an infraction is associated with their breeding habits and spawning. Detailed studies undertaken on the basis of the catches of the mechanised vessels working from Cochin showed that most of the species of prawns of the area exhibit size oriented movement in the fishing grounds and that their

movements are influenced by the phenomenon of upwelling and mud-bank formation.

The depth-wise distribution of prawns, as observed from the operations of the various exploratory vessels at three depth zones, namely, 0-40 m, 41-80 m and 81 m and above are shown in Fig. 2. In the Kutch region, less than 40 kg/hr of prawn in 0-40 m depth zone and less than 10 kg/hr in 41-80 m depth area are observed. In the Veraval-Cambay region, the catch of prawns is extremely variable, between 2.8 kg/hr and 66.9 kg/hr. The bull-trawlers working in the

same region landed 4.9 kg/hr from 0-40 m depth. In the Bombay region, a catch rate of 2.5 kg/hr is recorded from shallow regions and 7 kg/hr from the deeper zone. In general, higher abundance of prawns in the Bombay-Saurashtra waters is found along 20 fathom line (36 m). Off Ratnagiri, the Government of India vessels landed prawns at the rate of 2.6 kg/hr from shallow waters. Along Mysore coast, prawn catches are relatively higher on the southern areas, catch rate being 5.7 kg/hr at Karwar and 18.7 kg/hr at Mangalore, both from the shallower areas. Prawns are rarely encountered in the deeper regions.



Depending upon the season, extremely variable catch rates have been recorded from different areas off the Kerala coast. It has been found that the maximum return of prawns has been taken from 7 to 20 metre depth zone (50 kg/hr) which gradually declines to less than 5 kg/hr in the 37-42 metre depth zone and to insignificant level towards further depths. Our knowledge about prawns in the deeper regions in this area is essentially from the operations of the Indo-Norwegian Project vessels and of the Research Vessel 'Varuna'. It is generally found that areas off Kerala coast beyond 60 m to 110 m depth are beset with rocky patches and hence not suitable for trawling operations for demersal species. The occasional trawling operations in certain grounds of this region by R. V. Varuna have brought very small quantities of prawns, although it has been able to obtain some ripe *Metapenaeus monoceros* from 50-60 metres area off Cochin.

A significant discovery made during these years is the location of rich grounds along the continental slope of south-west coast of India for deep water prawns, hitherto unknown from the region. The extent of this ground is estimated to be about 5000 km² and the potential resource over 5,300 tonnes per year. The average catch rate recorded is 120.3 kg/hr using trawl nets with 35 to 47 m head rope.

On the east coast, information on the prawn population from the deeper grounds greater than 40 metre depth is scanty. On Tamilnadu coast, the operations of mechanised vessels are generally within 40 m depth and the catch rate varies between 5 and

20 kg/hr. The results of the exploratory vessels based at Vishakapatnam show that relatively better catches of prawns are obtained from 40-80 m depth region, the catch rate being 39 to 73 kg/hr. In the shallow region below 40 m depth, the catch rate is 3 to 4.5 kg/hr. At depth greater than 80 m, the effort and catch have been poor. Operations of the exploratory vessels off Gopalpur show a catch rate of 5-20 kg/hr in 0-40 m depth zone and off Sandheads 5-10 kg/hr. However, the operations of these vessels have not been consistent in this region.

BIOLOGY OF PRAWNS

Various aspects of the fishery biology of most of the commercial species of prawns are fairly well known. The penaeid prawns spawn in the sea and their larval stages (Nauplius, Protozoa and Mysis) are pelagic. In late larval and post-larval stages, which are completed in 2-3 weeks time, they enter the less saline environment of the estuaries and backwaters, where they settle to the bottom to feed and grow. Their food consists of both vegetable and animal matter provided in the environment they live in, the former being preferred in the earlier stages and the later in the adult stage. In the nursery areas of these estuaries they do not attain sexual maturity and hence they leave this environment and migrate to the sea where they grow to adulthood and spawn. It is estimated that most of these prawns spawn five times in their life, and the period in between two successive spawnings is about two months. The estuarine phase of these being short—varying between 5 and 10 months in different species—they are

mostly in 0 year class at the time of first spawning. The bulk of the fishery from the sea is supported by 0 and 1 year class prawns. The life span of these prawns does not extend beyond 2 years.

EFFECT OF EXPLOITATION

As the life history of prawns is completed in two different biological environments, their capture in each of these environments is bound to affect the fishery of the other. The commercial fishery for prawns has been in existence in both these environments for a long time. The general biology of the prawns is characterised by high fecundity, fast rate of growth, continuous breeding and short life span. Therefore, the nature of the fishery is somewhat like that of an annual crop, the success or failure of which is largely determined by the strength of recruits from the successive spawning. Under these circumstances, the wide fluctuations observed in the catches of certain years in some of the regions can only be due to fishery independent factors such as mentioned above. Due to the same reasons, the apprehension expressed about the depletionary tendencies in prawn fishery do not seem to be well-founded.

FUTURE PROSPECT OF PRAWN FISHERY

A review of the development of prawn fishery during the past 20 years show that the capture fishery which was carried out largely by the traditional crafts and gears, has gradually shifted to the mechanised trawlers which are

being enlarged and intensified year after year. Although the direct result of this development is an enhancement of efficiency and extension of the operational area of the prawn fishery, it has been necessarily restricted to such centres where necessary infrastructure was available. On account of this situation, considerable areas of fishing grounds even within 40 metre depth zone are remaining largely unexploited.

Information on prawn fishery in deeper regions beyond 40 metre depth is available only through the occasional exploratory cruises undertaken but these were not specific for prawns. Even this type of information is restricted to the southwest coast of India and to the Bombay region. No concerted effort has so far been made to explore the various regions systematically for prawn resources. Along the east coast, exploratory work has been very scanty and the data are available only for shallow regions of restricted areas. From the general distribution of prawns on the east coast and from the results of the exploratory work carried out at Vishakapatnam, it would appear that the deeper depth zone, 40-80 m along this coast is more productive for prawns as compared to similar depth areas on the west coast. In view of this, immediate steps should be taken to undertake systematic and planned exploratory surveys for prawn resources in areas deeper than the existing commercially exploited regions.

As there are vast unexplored and unexploited areas on both the coasts of

India, where prawns are likely to occur, any attempt to make an overall assessment of the prawn resources of the country as a whole can only be subjective at this stage. Based on some of the recent estimates a 2-3 fold increase from the present catch of prawns appears to be possible.

In addition to the marine resources, which are normally harvested from the natural stock, considerable quantity of prawns can be obtained by adopting culture practices. In India and in many south-east Asian countries, prawns are traditionally cultivated in brackish water ponds, adjoining low-lying areas and paddy-fields. The paddy-field prawn cultivation of Kerala occupies about 4500

hectares of low-lying fields distributed along the banks of estuaries and backwaters. The rate of production of prawns from these fields is found to be around 1500 kg per hectare. This culture practice neither involves wilful stocking of selected species nor feeding or raising. Several experiments are now in progress to improve upon the existing techniques of culture, and top priority is now being given to raise cultivated prawns on commercial scale. Prawn production from these sources is bound to assume importance in our country in view of the existence of large stretches of brackish water lagoons and estuaries which are ideally suitable for this purpose. ●●