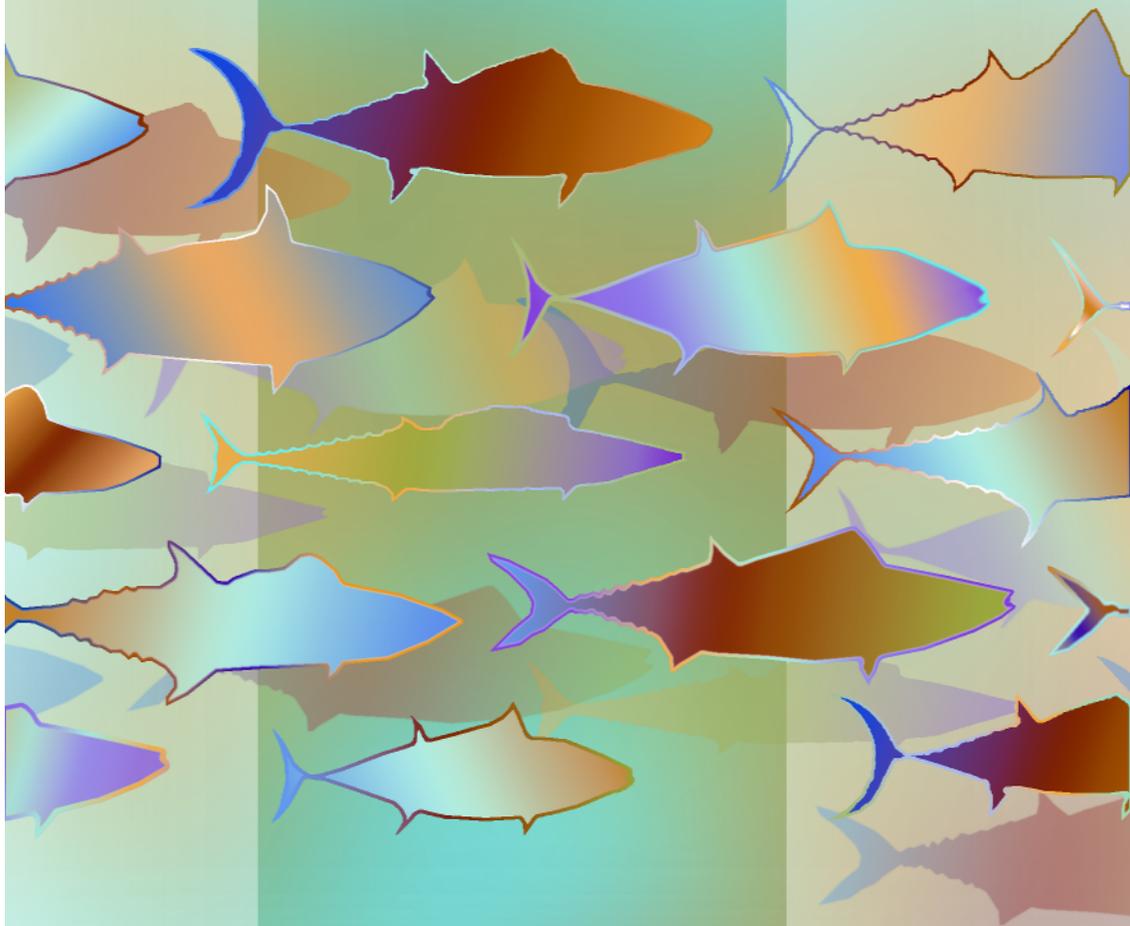


Status of Exploited
Marine Fishery
Resources of India



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Marine Crabs

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1. Introduction

Marine crabs are one of the valuable seafood items of great demand both in the domestic market and the export industry of India. Although there are about 600 species of crabs recorded from Indian waters, those commonly used for food belong to 3 families: Calippidae, Portunidae and Grapsidae. Of these, Portunidae includes the commercially important marine species such as *Portunus sanguinolentus*, *P. pelagicus*, *Charybdis feriatus*, *C. annulata* and *C. natator*. The country has a good fishery for marine crabs. Three species namely *C. feriatus* (Cross crab) *P. sanguinolentus* (Spotted crab) and *P. pelagicus* (Reticulate crab) (Figs. 1, 2 & 3) predominate the fishery of edible crabs in the Indian coastal waters. The cross crab is called Karchala in Gujarathi (G), Khekhada in Marathi (Mr), Kurisu njandu in Malayalam (M), Siluvai nandu in Tamil (Tn), Kankda in Oriya (O) and Kankra in Bengali (B). The vernacular name of the blue crab is Khekhada (Mr), Kavalan njandu (M), Olakkal nandu (Tn), Gelaipeeta (T), Chitra kankda (O) and Naksa kankra (B). The spotted crab is known as Khekhada (Mr), Kavalan njandu



Fig. 1. *Charybdis feriatus*

(M), Chukkalapeeta (T), Cheralapeta (O) and Lajabotikankra (B). The total estimated landings during 1999, 2000 and 2001 were 27,550 t, 48,380 t and 29,880 t, respectively. Trawlers land crabs mainly as a by-catch. Indigenous gears such as gill nets and traps are also used to exploit the resource.



Fig. 2. *Portunus sanguinolentus*

2. Production trends

The total catch of marine crabs in India during 1975-2001 is presented in Figure 4. The average catch per year is about 26,000 t. The fishery showed an overall improvement (40%) from



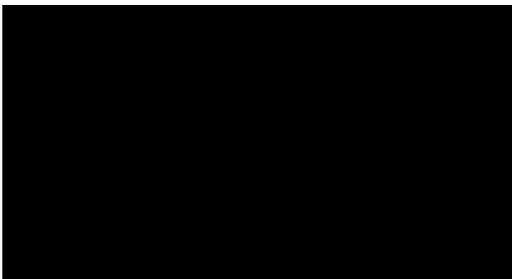
Fig. 3. *Portunus pelagicus*

nearly 20,000 t in 1975 to 28,000 t in 1999. However, the landing decreased to 14,000 t in 1978, 17,000 t in 1988 and 16,000 t in 1989. Exceptionally high landings were recorded in the years 1997 (45,000 t), 1998 (34,000 t) and 2000 (48,380 t). The fishery showed a steady improvement from the year 1989 to 1997 (Fig. 4). Though there was a decline in the following

years, the annual landing improved to 48,380 t in the year 2000. The percentage composition of crabs in the total crustaceans landed in India during 1994-2001 is presented in Figure 5. On an average, crabs formed about 8% of the total crustacean landings.

Statewise contribution

Maximum landing of crabs during the year 2000 was reported from Gujarat (43%). The catches were comparatively good in the southern states, Tamil Nadu contributing to 28%, Kerala 12% and Andhra Pradesh 6%. Landing was of a lesser magnitude in the other maritime states. The average statewise catch-composition of crabs during 1996-2000 is given in Figure 6. Nearly 33% of landing was reported from Tamil Nadu,



31% from Gujarat, 17% from Kerala and 8% from Andhra Pradesh.

Regionwise contribution

A regionwise analysis of the landings of crabs during the year 2000 shows that maximum landings were reported from the northwest (21,565 t) and southeast (16,562 t) regions. The percentage contribution from the northwest region was 45%, the southeast region 34% and the

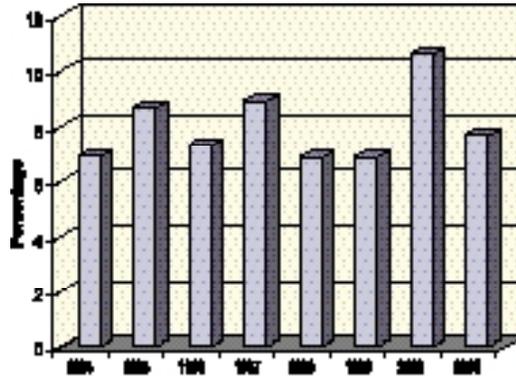


Fig. 6. Percentage of crabs in total crustacean landings in India during 1994-2001

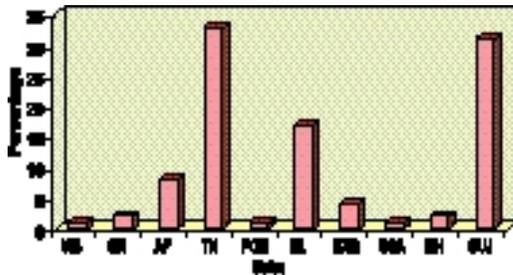


Fig. 8. Percentage of statewide crab landing in India during 1994-2000

southwest region 17%. However, in the year 1999, maximum landing was reported from the southeast region (54%) followed by the southwest (22%), northwest (18%) and northeast (5%) regions. An analysis of the quarterwise landing of crabs in 2000 showed that maximum catch (44%) was during the first quarter. About 28% was landed

during the second quarter and 16% during the fourth quarter. The quarterwise and regionwise landing of crabs during the year 2001 is presented in Figure 7. Only small quantities of crabs were landed during August-October, the post-monsoon months, along the southwest coast of the country. A similar trend of production was observed during the previous years also.

Gearwise contribution

Crabs are landed mainly as a by-catch of trawlers, mostly caught from a depth of about 10-60 m. Recent advances in fishing technology have enabled fishermen to venture into deeper waters indulging in

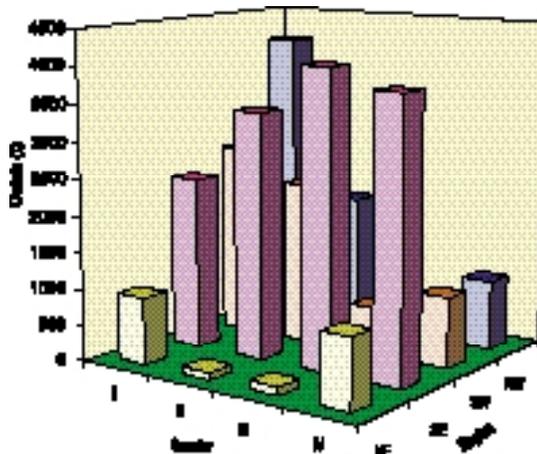


Fig. 7. Quarterwise landing of crabs in different regions of India during 2001

multi-day fishing and this has resulted in increased exploitation of the crab resources, especially *Charybdis* spp. Gill net and trap are also used at centres like Calicut, Vizhinjam and Mandapam for exploiting crab resources. However, the major gear used for exploiting marine crabs is the trawl net. In Gujarat, from where about 43% of the total crab landing in India during 2000 was reported, the mechanised long-voyage trawlers contributed to 94.5% and the mechanised trawlers which made one-day trips, 4%. In Tamil Nadu, the state which accounted for 28% of the total crab landing, the mechanised trawlers landed 59%, non-mechanised bottom-set gill nets 20% and the out-board engine bottom-set gill nets 11% of the catches. In Kerala, the state which ranked third in the landing of crabs in 2000, the mechanised trawlers making single-day fishing, mechanised multi-day trawlers and out-board engine trawlers contributed 68%, 19% and 7% respectively, to the total crab landing.

Species and size composition

The total landing of crabs at Veraval in 2000 was 8,988 t. *C. feriatus* contributed to 7.7% of the catches. The modal classes for male and female crabs were at 61-65 mm and 56-60 mm (carapace width) respectively. The crabs other than *C. feriatus* generally came under non-edible groups. The total estimated catch of crab landed at New Ferry Wharf in Mumbai was 277 t at a catch rate of 10 kg/boat trip. The catch was maximum in October and minimum in July. *C. feriatus* predominated the fishery (44%) followed by *P. sanguinolentus* (6%) and *P. pelagicus* (5%). Sizes between 63 and 113 mm formed the mainstay of the fishery for *C. feriatus*. Percentage of berried females was maximum in December. The total estimated landing of crabs by trawlers at Karwar was 211 t, at a catch rate of 3 kg hr⁻¹. *P. pelagicus* predominated the fishery (81%) followed by *P. sanguinolentus* (15%) and *C. feriatus* (3%).

Trawlers landed 979 t of crabs along the Mangalore-Malpe coast in 2000. *P. sanguinolentus* dominated the fishery contributing to 42% of the total catch followed by *P. pelagicus* (32%) and *C. feriatus* (26%). In the indigenous fishery, ring seines and hand trawls were operated at Malpe for the exploitation of crabs during the monsoon months. The total estimated landing at Cochin Fishery Harbour during the year was 253 t. *C. feriatus*, *P. sanguinolentus* and *P. pelagicus* contributed to the fishery. About 82% of the landing was recorded during January-May. In *P. sanguinolentus*, the size ranged from 71-75 mm to 131-135 mm in males and from 76-80 mm to 146-150 mm in females. Sizes between 91-95 mm and 101-105 mm formed the mainstay of the fishery. Nearly 28% of the female crabs were in berried stage. In *C. feriatus* sizes between 51-55 mm and 76-80 mm formed the mainstay of the fishery. About 48% of the female crabs were in berried stage. Sexes were more or less equally distributed in *P. sanguinolentus* whereas males predominated (77%) the catches of *C. feriatus*.

At Vizhinjam, an estimated total of 11 t of crabs, (96% *P. sanguinolentus*) were landed during 2000 by trammel nets (Konchuvalla) operated from vallom or catamaran. Peak landing was recorded in June-July. The total estimated landing of

crabs by bottom-set gillnets at Tharuvaikulam in Tuticorin during the year was 107 t, at a catch per unit effort of 16 kg. Maximum catch was recorded in March. *P. pelagicus* dominated the fishery contributing to 44%, and was followed by *P. sanguinolentus* (22%). 178 t of crabs were landed by trawlers at Mandapam where the fishery was constituted by a single species, *P. pelagicus*. At Thoppukkadu, 10 t of crabs were landed by Nanduvalai, 28% of which was constituted by *Scylla tranquebarica*. The crab landing by mechanised trawlers at Kasimedu in Chennai during the year 2000 was 653 t. *P. sanguinolentus* dominated the fishery (55%). Berried females were more in April. 344 t of crabs were landed at Kakinada by small mechanised trawlers. 63% of the catch was constituted by *P. sanguinolentus* followed by *C. lucifera* (17%), *C. feriatus* (9%) and *P. pelagicus* (9%). The non-edible crab fishery (226 t) was dominated by *C. callianassa*. *C. feriatus* predominated the fishery at Veraval, Mumbai and Cochin, *P. pelagicus* at Karwar, Calicut, Tuticorin and Mandapam and *P. sanguinolentus* at Mangalore, Chennai and Kakinada.

3. Biology

Portunus sanguinolentus, *P. pelagicus* and *Charybdis feriatus* are the dominant species of edible marine crabs landed in India. Studies have been carried out on the biology and fishery of important edible species of crabs at Veraval, Mumbai, Karwar, Mangalore, Calicut, Cochin, Vizhinjam, Tuticorin, Mandapam, Chennai and Kakinada centres of the Central Marine Fisheries Research Institute. Studies on the food and feeding habits of crabs show that they generally feed on smaller crustaceans, fishes and molluscs. Detritus, bits of plant and other organic materials are also noticed in the stomach contents. The mean monthly growth rate ranges from about 8 mm to 11 mm. Sizes up to 160-165 mm (carapace width) are available in the fishery. The 50% level of maturity is generally at 90-105 mm carapace width in *P. sanguinolentus* and *P. pelagicus*. These crabs breed throughout the year with peak seasons and spawning may take place twice or more in a season. Peak breeding and recruitment seasons vary from region to region. The number of eggs on ovigerous females ranges from about 50,000 to over a million. Eggs are attached to the endopodite setae of the swimmerets of the abdomen. The eggs that hatch out pass through a number of zoeal stages.

Post-larval growth is often rapid in pre-pubertal crabs but slows down after the moult of puberty. A moult of pre-puberty marks differentiation of relative growth rates between sexes and occurs over a range of carapace widths. Accompanying growth are changes in body and limb proportions. Regeneration of lost appendages through autotomy is also noticed. Growth is accomplished by moulting (ecdysis). Although the size increase is discontinuous, the preparations for and the casting of the old exoskeleton are a continuous growth process involving physiological and physical changes. An essential part of ecdysis is the uptake of water. Occurrence and establishment of crab species in particular habitats depend upon many inter-related factors including availability of suitable food, shelter, salinity and temperature. Food preference affecting distribution has been demonstrated.

4. Stock assessment

Rational exploitation of the crab resources can be ascertained by understanding the present status of the stocks. Age and growth of *P. sanguinolentus* and *P. pelagicus* have been investigated based on data collected from commercial catches and rearing experiments. One of the recent studies based on size-frequency analysis indicates that the rate of growth is high in juveniles while the adults show relatively lower and differential rates of growth in males and females. In *P. sanguinolentus*, the mean monthly growth rates were 10.3 mm and 8.8 mm, attaining a carapace width of 124.1 mm and 112.5 mm on completion of one year, in males and females respectively. In *P. pelagicus*, the average monthly growth rates were 11.0 mm and 9.6 mm attaining a carapace width of 145.2 mm and 132.5 mm by the first year, in males and females respectively. It is indicated that the population of these crabs, exploited by different gears comprises mainly of the 0-year class, the 1-year-olds forming only about 10% or less. However, the gill nets which are used at certain centres, during peak seasons of occurrence of crabs, land large proportion of the one-year-olds, possibly due to the larger mesh size. The present status of the stocks along the Karnataka coast was assessed recently. The standing stocks were estimated at 308 t for *P. sanguinolentus* (154 t each for males and females) and 161 t for *P. pelagicus* (70 t and 91 t for males and females respectively). The annual average stocks were 1,272 t for *P. sanguinolentus* (658 t for males, 614 t for females) and 834 t for *P. pelagicus* (394 t for males, 440 t for females). The maximum sustainable yield (MSY) estimated for *P. sanguinolentus* was 776 t (403 t for males and 373 t for females) and for *P. pelagicus*, 567 t (275 t for males and 292 t for females) which are very close to the annual average yield of 771 t and 564 t respectively.

5. Management

With the practice of multi-day fishing, which necessitates facilities for freezing or icing the priced catches, crabs get landed usually after sorting. Thus species and sizes that are not used for human consumption are often discarded in the sea. This makes it all the more difficult to estimate the quantity of catches discarded or the quantity of juvenile crabs being caught. In Gujarat, large quantities of crabs are landed in a putrefied state and are used for production of fish meal. Studies on the resources of crabs from the various maritime states show that as such, the fishery shows an overall improvement. One of the reasons cited for the improvement in the landing of crabs in recent years is the utilization of *C. feriatus* for human consumption. The improvement in the catches is the result of expansion of the fishing activity to deeper waters by fishermen engaged in multi-day fishing. However, in order to ascertain rational exploitation of the stocks of crabs it is desirable to increase the cod-end mesh size of trawl nets to not less than 40 mm. Recently, species such as *P. sanguinolentus* and *P. pelagicus* have found place in the seafood items exported from the country. This may result in an increase in the demand for crabs in the near future.

6. Suggested reading

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