

Lobster Fishery and Management

E.V. Radhakrishnan

Central Marine Fisheries Research Institute, Cochin-682018, India.

Lobsters are one of the highly priced crustaceans in India and are in great demand as a delicacy in the internal market and as a foreign exchange earner in export market. Gourmets the world over prize this crustacean as the most delectable. As a result, lobsters are now fished indiscriminately and their population at least in certain areas are threatened. Most females either don't get a chance to reproduce or are caught while they are breeding. Unlike other lobster fishing and exporting countries, the regulatory measures are not enforced strictly in India and thereby this resource is unremittingly fished and exported. Scientists are concerned and are calling for stiffer controls. The fishermen and the industry, on the other hand, have no will to follow the regulations. As lobster is a low volume resource, management regulations for lobster fishing are not enforced by maritime state governments. Skilful management must weigh potential short term losses against long term gains and ultimately sustainability and conservation of the resource is the primary aim of resource management.

DISTRIBUTION

They are widely distributed along the entire coast with maximum landings from the northwest coast, followed by the southwest and southeast coasts. The lobster fishery along the northwest coast comprising Gujarat and Maharashtra, is constituted by the palinurid lobster, *Panulirus polyphagus* and the scyllarid, *Thenus orientalis*. These two species dominated lobster fisheries till the early 1990s in the country, contributing to nearly three-quarters of the total landing. However, the slipper lobster fishery in Maharashtra witnessed an unusual collapse by 1994, and has been showing signs of recovery since 2007. *P. homarus* dominates shallow water lobster fishery along the southwest coast. *Panulirus versicolor* and *P. ornatus* are also landed in small quantities. Major landing centres are in Kanyakumari district in Tamil Nadu. The deep sea lobster, *Puerulus sewelli* is fished at depths ranging from 150-300 m along the southwest and southeast coast. Small scale fishing for *T. orientalis* was reported from Quilon from 2004 onwards. The major species exploited along the

southeast coast of India are *P. homarus*, *P. ornatus*, *P. versicolor* and *T. orientalis*. *Linuparus somniosus* is exploited in small quantities from Andaman and Nicobar Islands. A number of new records of lobsters have been recently reported from deeper fishing grounds along the southwest coast.

Life cycle

Unlike the homarid lobsters, the female is receptive during the intermoult period while her shell is hard. The male deposits the sperm on the ventral sternal plate. During spawning, the female scratches the spermatophore and exposes the sperm containing in the sperm packet to the oozing ova from the ripe ovary and gets fertilised. The fertilised eggs attach to the setae on the endopods and undergo embryonic development until hatching. The female may either spawn again or undergo ecdysis. The floating phyllosoma larvae undergo metamorphosis and finally emerge as the post larva called puerulus or nisto. Spiny lobster larva takes 4-12 months to become puerulus whereas phyllosoma larva of *T. orientalis* metamorphoses to nisto in 25-30 days. The puerulus swims from offshore waters to the inshore areas for final settlement where it spends its juvenile life. The lobster periodically sheds its exoskeleton for growth.

Most of the spiny lobster species are gregarious and nocturnal and therefore hides in rocky crevices during day and forage for the prey during night. Lobsters feed on mussels, polychaete worms, sea urchins and algae.

BIOLOGY

The total length attained by the spiny lobsters are: *P. homarus* 320 mm, *P. polyphagus* 450 mm and *P. ornatus* 500 mm. Growth rate is identical in juveniles but differential in adults. In *P. polyphagus*, 50% sexual maturity is attained at 205 mm TL for females. Though the species breeds throughout the year, maximum number of females in berry is observed during August-October and recruitment of juveniles measuring < 100 mm (<50 g) generally takes place during December-January. In spiny lobsters fecundity ranges from 50,000 to 1,000,000 depending upon the species and the size of lobster. *P. sewelli* ranges in size (TL) from 76 mm to 190 mm in males and from 71 mm to 205 mm in females. Occurrence of maximum number of immature females in January and smaller size –classes during December –January indicate entry of young ones into the fishery during these months.

FISHERY

The total all India decadal annual average landings increased from 1825 t during 1970s to 2130 t in 80s and 2232 t in 90s. However, landings declined to an

average 1541 t during the current decade (2000-2008) and the year 2005 recorded the lowest catch of 1201 t. The highest landings in India were during 1984-87 (mean catch 3225 t). Average landing from 2005-2007 was 1400 tonnes, with Maharashtra contributing maximum (41%) and Gujarat 22%. Gujarat recorded its lowest catch of the decade, 184 t in 2005. The percentage contributions in catch by Tamil Nadu and Kerala were 19% and 8%, respectively. In Maharashtra, the commercial fishery for *T. orientalis* was initiated in 1978, with a catch of 1.5 tonnes. The landing reached a maximum of 375 tonnes in 1982. Subsequently the catches fluctuated around 250 tonnes and reached another peak (334 tonnes) in 1986. But, thereafter the catches declined steadily, landing only 2.2 tonnes in 1994. As a consequence the fishery collapsed and in 2007 the species re-emerged with a landing of 7.3 t.

RESOURCE MANAGEMENT

Stock assessment studies were carried out to determine the mortality and exploitation rates based on which management strategies are framed. Most of the lobster stocks along the Indian coast are overfished and therefore urgent measures are required to protect the species from further decline. Lobsters are highly vulnerable to fishing because of their gregarious behaviour and movement during breeding. The prolonged larval life affects their survival and they are predated by rays, octopus and other large carnivorous fishes.

As the trawl fishery for lobsters in India does not constitute an exclusive target fishery, optimizing trawlers for lobsters alone is not an option. Observing a closed season for lobsters during the peak breeding season (August-September) is also not practical as trawl ban is already practiced based on the multi-species fishery in different states. Hence, one of the options left is to return egg-bearing females back to sea at least during the peak spawning season (August-September), so that the spawning stock is protected. Heavy recruitment of juvenile and sub adult lobsters (40-160 g) takes place in December-February and since these undersized lobsters do not fetch remunerative price to the fishermen they can also be returned to the sea. The Minimum Legal Size (MLS) for export of whole cooked *P. polyphagus* is fixed at 250 g with this motive. These options are possible if it is legalized to catch lobsters only above the size at maturity (205 mm in total length or 220 g size) and returning the egg-bearing females back to the sea. *P. polyphagus* is a hardy species which remain alive for 1-2 hours after it is brought on board by the trawl net. Hence, releasing back the undersized and berried lobsters is recommended. This will protect not only the new recruits but also the spawning stock ensuring future recruitment process. Mesh size regulation is not practical as *P. polyphagus* appears as bycatch in shrimp trawls. The sustainability of *P. polyphagus* fishery at a lower magnitude is attributed mainly to its high fecundity and breeding throughout the year. The

long larval phase and the consequent small percent of recruitment show that the lobster is a highly vulnerable species biologically. If regulatory measures are not strictly enforced, gradual decline and complete annihilation of the stock as in the case of *T. orientalis* is possible. Intensive exploitation of juveniles of *P. polyphagus* from the inshore reef area by gill nets is to be banned if the lobster fishery is to sustain. Legal ban on fishing of juveniles by the gear is to be enforced by the State Government. In *T. orientalis* which occurs only in small numbers along the coast of Maharashtra, strict enforcement of regulatory measures is to be implemented to further improve the landing and rebuild the stock.

Spiny lobster fishery is an open access fishery and any restriction imposed on fishing will be desisted by the fishermen. Apart from legal implementation of fishing regulations, education and creation of awareness among the various stakeholders on the negative impact of fishing and marketing juveniles and egg-bearing lobsters may bring a subtle change in the mindset. Establishment of artificial habitats and lobster sanctuaries/reserves in identified locations is desirable.

A participatory management project initiated by CMFRI and CIFT, and funded by MPEDA is making slow progress in changing the mindset of fishermen and traders and may inculcate a sense of responsible fishing and trade. Village-level meeting, distribution of educative posters, stickers and pamphlets, video film shows, 'V' notching and releasing of egg-bearing lobsters involving the fishermen and distribution of lobster traps to wean the fishermen away from using the destructive fishing methods are some of the activities implemented under the programme. Enforcement of Minimum Legal Size (MLS) for export is a positive step from the Ministry of Commerce and Industry, Government of India. The MLS is arrived at considering the biological features of each species.

*Minimum Legal Size for export of lobsters from India**

<i>Species</i>	<i>Live /Chilled / frozen</i>	<i>Whole cooked</i>	<i>Tail</i>
<i>Panulirus polyphagus</i>	300 g	250 g	90 g
<i>P. homarus</i>	200 g	170 g	50 g
<i>P. ornatus</i>	500 g	425 g	150 g
<i>Thenus orientalis</i>	150 g	-	45 g

* *Notification by the Ministry of Commerce and Industry, Government of India, 2003*

The objective is that MLS should be above the size at first maturity so that the lobsters get an opportunity to breed at least in one breeding season.

P. polyphagus is mostly exported as whole-cooked, whole chilled or as tail, whereas *P. homarus* and *P. ornatus* are mostly exported as live or whole frozen/chilled. In the case of *P. ornatus* the breeding population is mostly protected because of their movement to deeper waters for spawning. However, implementation of a minimum legal size for fishing, closure of fishery during peak spawning in the southern spiny lobster fishery and ban on trammel nets are regulatory measures to be implemented by State Governments. Lobster fishing being a socio-economic activity involving the local fishermen, any regulatory measure shall consider the socio-economic aspects so that the fishermen are not adversely affected.