

## TOWARDS SUSTAINABLE UTILIZATION OF PENAEID PRAWN RESOURCES IN SRI LANKAN WATERS

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The Penaeid prawns (Phylum - Arthropoda, Class - Crustacea, Family - Penaeidae) are very important as a commercial fishery resource in the world. Penaeid prawns are widely distributed in the Indian Ocean and surrounding areas. These are the most valuable of the crustaceans in waters around Sri Lanka, India, Malaysia, the Gulf and many other regions. In Sri Lanka this fishery is very important as it is a very good foreign exchange earner. Among marine products exported from the country, frozen prawns is a major item. Valued the earnings from prawn exports are around 70% of the total foreign exchange earned from marine products which amounts to about Rs. 303 million (Anon. 1985).

The world total fish production has been recorded as 84,945, 300 MT out of which 2,548,200 MT has been recorded from the Western Indian Ocean region to which Sri Lanka belongs. The total production of Sri Lanka has been recorded as 175,409 MT (FAO 1985).

To the world fish production the Crustaceans contribute 3.8% and to the total production of the Western Indian Ocean region the Crustaceans contribute 1.78%.

According to the Ministry of Fisheries (Anon. 1985) the coastal marine prawn production is around 4,000 MT which contributes 3% by weight to the total marine landings of Sri Lanka. Although the contribution to the total production of fish around Sri Lanka is low, valued prawn resources are very important to the economy of the country. This group is also very important because of their abundance and relatively large population sizes.

Most of the penaeid prawns are marine, but show migratory behaviour. They spawn in deeper areas of the sea and eggs and larvae are found in surface and sub-surface waters (Subramanyam, 1965). According to Manisseri and Manimaran (1981), they spend the juvenile stages in estuaries and again move out to sea at the sub adult stage.

According to de Bruin, 1970, the salinity, sub-strata and depths play important roles in segregating species of penaeid prawns in estuaries and in the sea. His study of the distribution of penaeid prawns in estuaries and seas around Sri Lanka shows that some species are found in

both estuaries and the sea while others are purely marine. To the former category belong *Penaeus indicus*, *P. semisulcatus*, *P. latisulcatus*, *P. monodon*, *P. merguensis*, *Metapenaeus dobsoni*, *M. tolensis*, *M. mannarensis*, *Trachypeneus salaco*, *T. sedili*, *T. curvirostis*, *Atypopenaeus stenodactylus*, *Parapeneopsis maxillipedo*, *P. uncta*, *P. tenella*, *P. coromandelica* and *Parapenaeus longipes*. *Metapenaeus elegans* and *M. burkenroadi* were found only in estuaries.

*P. indicus* and *P. monodon* were found in estuaries right round the island, but *P. semisulcatus*, *P. latisulcatus*, *Metapenaeus burkenroadi*, *M. monoceros*, *M. affinis*, *M. ensis*, *Parapeneopsis cornuta* and *P. nana* were found restricted to the high salinity lagoons of the northern and eastern regions and more saline mouths of estuaries of low salinity lagoons of the south-west and southern regions. *Metapenaeus elegans* and *M. dobsoni* were either absent or scarce in the north and east, but abundant in the south-west and southern regions.

In the sea most species avoid hard-bottom such as coral, granite and sand stone. *Penaeus semisulcatus* was found to be abundant on soft green mud sharing with *Penaeus merguensis*, *Metapenaeus monoceros*, *M. affinis* and *M. ensis*, *P. indicus* was reported to be abundant on very soft sand and also on a bottom of mud and sand.

Although *Metapenaeus dobsoni* and *Parapeneopsis coromandelica* were found in mud and sand their distribution was also found to be affected by depth since they were not found on patches of mud and sand beyond 7 fathoms. *Trachypeneus salaco*, *Metapenaeopsis stridulans*, *M. tolensis*, *Atypeneus stenodactylus* were restricted to depths varying from 10 - 13 fathoms.

In the Indo Pacific region 33 species of penaeid prawns have been recorded from Pakistan, India and Sri Lanka. Out of these, 31 species have been recorded by de Bruin (1965) in Sri Lankan waters. Siddeek (1978) recorded a new species the *Parapeneopsis stylifera* (Milne Edwards) which raised the total upto 32.

The main prawn landing centres of the West coast of Sri Lanka are Negombo and Chilaw. The total annual production from these areas exceed 600 MT per annum,

contributing to more than 15% of the total annual production of shrimps around the island. At Kalpitiya which is the major landing site in the North - Western coast an annual production of 75 MT per annum has been recorded. These prawns are caught from the Portugal Bay trawling ground. Palk Bay shrimp trawling ground also contributes a considerable amount.

In these areas many commercially important species of penaeid prawns have been recorded. The species of the genus *Penaeus* which command the highest prices in the local market as well as in foreign countries are *P. indicus*, *P. monodon*, *P. merguensis* and *P. semisulcatus*. These are categorised as large prawns having a length range of 12 - 20 cm. Out of these species *P. indicus* catches constitute about 60% of the total annual shrimp catch from Negombo and Chilaw areas (Jayawickrema & Jayakody, 1991). At Kalpitiya *P. semisulcatus* contributes about 92% of the annual catch (Jayawickrema & Suraweera, 1989). In the Palk Bay too *P. semisulcatus* is the major constituent (Siddeek, 1986).

The catches also comprise smaller prawns of the length range 10 - 15 cm, such as *Parapeneopsis stylifera*, *P. cornuta*, *P. coromandelica* and *Metapenaeus dobsoni*. These are in great demand in the local market.

Because of the commercial importance of penaeid prawns a lot of work on various aspects of their biology, taxonomy; population dynamics and stock assessment studies have been carried out in Sri Lanka as well as in other areas of the Indo-Pacific region.

De Bruin (1965) has made taxonomic studies of Penaeid prawns and their distribution in Sri Lankan waters. De Bruin 1970, 1971 has also described the distribution and relative abundance of Penaeid prawns in the estuaries and seas around the island.

According to de Bruin (1970), the capture methods of penaeid prawns also vary from area to area. Trawling in the estuarine waters is found to be impracticable on account of the presence of submerged logs and stakes. However, local fishermen fish for penaeid prawns round the island using simple types of gear. In estuaries on the south - west coast between Panadura and Galle the common method of capture is the Kraal or Ja-kotu. Later on, this method of capture has spread to Puttalam and Jaffna. In Negombo and Chilaw estuaries, prawns are captured at night by stake seines set against the direction of the current. The commonest method of capture in other parts of Sri Lanka (estuaries and lagoons) is the cast net.

In the sea, prawns are mainly caught by trawling. In Negombo trawling is carried out by sail driven, out-rigger canoes whereas in Chilaw, trawl net is operated by sail driven canoes and operated by mechanised FRP boats.

In Kalpitiya too prawn trawling is carried out by mechanised 3.5 ton and 11 ton boats. In Palk Bay three types of gear have been employed to carry out prawn fishery; trawling conducted by 3.5 ton mechanised boats, the gill net and trammel net fishery carried out by FRP boats and non-mechanised log crafts (Siddeek, 1986).

Population dynamics and stock assessment studies are very important in the management of any living resource. Any commercially important living resource can be exploited within a limit. This is called sustainable utilization which is the use of the resource by the present generation and protecting this to be utilized by the future generation.

Regarding the shrimp resources around Sri Lanka many workers have carried out studies on proper utilization. Siddeek (1986) has carried out biological impact studies on shrimp trawling in the Palk Bay area. The results have indicated that there is no immediate threat from the trawlers to the shrimp resources in this area, but rather a beneficial effect because of the introduction of larger mesh sizes in the cod-end of the trawl net.

The Portugal Bay trawling ground off Kalpitiya is also a very rich prawn ground. In this area Suraweera and Jayawickrema, (1989) carried out a biomass estimation of *Penaeus semisulcatus*. The mean stock biomass of this area has been estimated as 4 MT. The maximum sustainable yield (MSY) which is the yield that can be exploited maximally without affecting the standing stock has been calculated as 42 MT. The results indicate that the *P. semisulcatus* stocks in this trawling ground is over-exploited and it is necessary to regulate the number of boats operating in this area.

Siddeek and Jayakody (undated) have estimated the standing stock biomass of many species of prawns in the Chilaw sea such as *Penaeus indicus*, *P. semisulcatus*, *P. monodon*, *Metapenaeus dobsoni* and *Parapeneopsis stylifera* to be 3,133 kg, 1,095 kg, 313 kg, 2,509 kg and 1,764 kg respectively. More than one hundred 3.5 ton mechanised crafts operate here. According to Jayawickrema and Jayakody (1991) the yield per recruit studies on *P. indicus* which is the most commercially important prawn species caught in this area indicate that the present yield can be increased by 14% to get the optimum yield. But according to yield per recruit analysis, increasing the minimum mesh size and increasing the fishing effort should be carried out concurrently to get the optimum yield.

The Negombo area is well known for prawns caught in the sea as well as in the Negombo estuary. For assessment of the prawn stock in the sea around Negombo a direct relationship between the fishing effort and the associated catch was employed (Jayakody and Jayawickrema, 1987) to find out the maximum sustainable yield (MSY). The

1982 in Negombo have been oriented towards a declining trend which is a sign of overfishing.

In areas southwards from Colombo ie, Kalutara, Beruwala, Galle and further southwards there is no intensive fishery going on except for a few sail driven canoes and fiber glass boats employed in trammel netting.

Overfishing is the main threat to the prawn population around Sri Lanka. Overfishing is a process which develops slowly and steadily over a period of several years. Although the fishing effort does not show a significant increase over the period, repeated fishing in the same area can have a harmful effect on the prawn population.

Overfishing can occur in two different ways. Growth overfishing can be due to the massive removal of new recruits which is indicated by the appearance of very small prawns in the catches. In addition to this, repeated fishing of spawners can lead to a depletion of the stock which is termed recruitment overfishing. As most of the prawns spend a part of their life cycle in the lagoons and estuaries (Manisseri and Manimaran, 1981) factors like, heavy fishing of sub-adult stage in the lagoon, change in the physico-chemical factors of these areas, depletion of mangroves etc. can also cause depletion of shrimp stocks.

In order to manage the prawn fishery at a sustainable level, regulations on the number of boats operating and the minimum mesh size of the nets can be employed. The regulation of the number of boats operating is a complex problem which involves many socio-economic factors.

In the case of shrimp trawling it is difficult to impose mesh regulations too. This is a multispecies fishery where shrimps of a broad size range are caught by the gear. Smaller sized shrimps are also commercially important because these are preferred by locals. The larger ones are important as foreign exchange earners. Therefore, the calculation of a single optimum mesh size for trawlers should be determined as an average weighted according to weight and the economic value of each species.

Now we can understand how the prawn stocks around Sri Lanka are affected by improper fishing practices. It is our duty to exploit all biological resources sustainably keeping in mind that these should be conserved for our future generations.

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