

Saga of inshore prawn fishery of Kerala

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Abstract

The marine shrimp fishery in Kerala existed even before the advent of the Indo-Norwegian project. (INP), but the genesis of a commercial-scale fishery happened due to the INP. Earlier fished by artisanal crafts and gears, the introduction of trawlers saw the establishment of shrimps as the major marine fishery commodity. The penaeid shrimps *Metapenaeus dobsoni*, *Parapenaeopsis styliifera*, *Penaeus indicus*, *Metapenaeus monoceros* and *Metapenaeus affinis* are prominent in the inshore shrimp fishery of the state. Many developmental changes which happened from time to time in craft and gear technology and the extension of fishing grounds brought considerable changes in the fishing pattern have influenced the inshore shrimp fishery of Kerala which can be classified into five phases – primary, growth, declining, enhanced growth and stagnant.

Introduction

The erstwhile Indo-Norwegian project (INP) in 1953, set in motion a profit oriented prawn fishery in Kerala, bringing remarkable transformation in fishing practices. Prior to this, fishing was by traditional methods, using gears like drift nets and gill nets in small country crafts. Here we discuss the inshore prawn fishery of Kerala for the period 1950-2020 which can be divided into five phases - primary phase (1950-62), growth phase (1963-1973), declining phase (1974-1985), enhanced growth phase (1986-2001) and stagnant phase (2002-2020) (Fig. 1). Several published works were also referred in the preparation of the article and to cite a few - George *et al.*, 1963; Rao *et al.*, 2013. Kerala has nine coastal districts - Thiruvananthapuram, Kollam, Alapuzha, Ernakulam, Thrissur, Malapuram, Kozhikode, Kannur and Kasargode, with 220 fishing villages (CMFRI, 2016) 21,684 active fishing crafts (3800 mechanised, 13,868 motorised and 4016 non-motorised boats), which contribute to the prawn production of the state.

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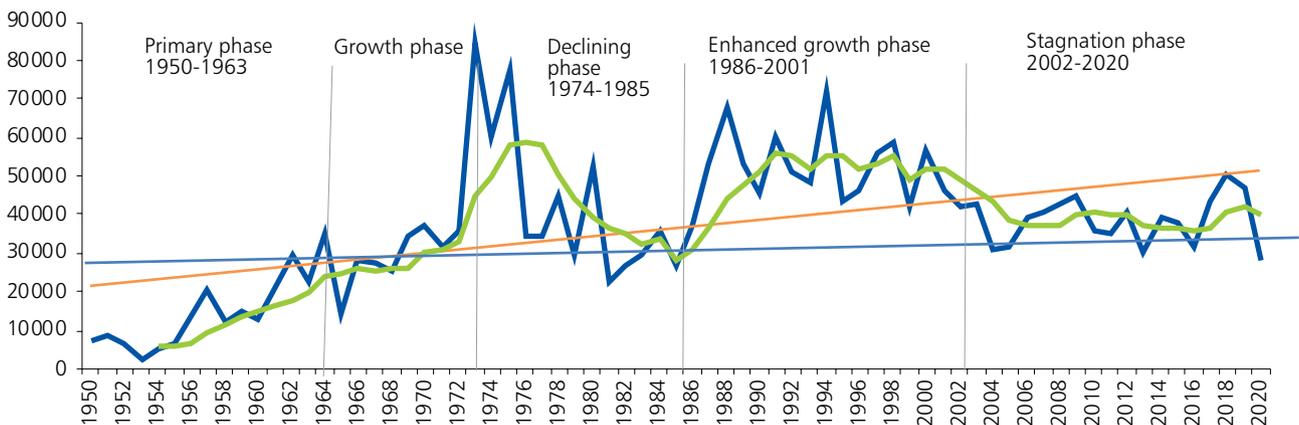


Fig. 1. Different phases of inshore prawn fishery in Kerala during 1950-2020

Primary phase (1950-1963)

Traditional fishing and exploratory fishing

Prior to the advent of the INP, artisanal fishery thrived in Kerala using boat seine, shore seines and gillnets. These gears exploited prawns within a narrow coastal strip of 5 - 20 m depth. The boat seine locally known as *kollivala* or *thanguvala* varied in size from region to region, in Central Kerala it was known as *thanguvala*, having mesh size of 2 cm. Two other boat seines operated were *Vattavala* and *koruvala*. Shore seines locally called *kambavala* was used for catching prawns close to the shore. Along Cochin-Alapuzha coasts, a smaller type of shore seine known as *nonavala* and small drag nets *vadivala* were prevalent. During southwest monsoon season (July to September) cast nets were also used for fishing prawns. Fishing by these gears was vigorous in Cochin especially boat seine, in the late 1950's with peak catches during July to September mainly supported by *Metapenaeus dobsoni* (65-99%). During 1962 catch (96.5%) from traditional vessels declined to an average of 15.5% in 1977-80 and 24.2% during 1980-85. The decline in catch from these gears after 1971-1972 was due to fishing for prawns by single day trawl, mini trawl and ring net.

Exploratory trawling was conducted in the early 1900 along the Malabar coast by SS Margarita in 1908 and off Kannur by Sutherland and Turbinella during 1908-11. In the year 1953, inking an agreement between the Government of Norway and Government of India initiated the Indo Norwegian Project (INP) for the welfare of the fishing community and Neendakara in Kollam District of Kerala was chosen. The project mainly focussed on mechanisation of boats and laying fishing harbours. Three experimental trawler boats (M. O. Christensen, Cochin 65 and Travancore 56) were introduced by the INP in Kochi in 1953. These trawlers located rich prawn ground in the Arabian Sea, outside the Malabar coast which were termed as the richest ground. Between 1957 and 1961 several exploratory surveys were conducted - Asok & Pratap off Cannanore in 1960-61, off Calicut in 1957-58, off Cochin 1957-58, off Alleppey-Quilon 1958-59 and Tarpon & Samudra off Cochin in 1957-58 which started fishing operations with bull trawl, later including other trawls, catching prawns comprising species - *M. dobsoni*, *Metapenaeus affinis*, *Parapenaeopsis stylifera*, *Penaeus indicus*, *Penaeus monodon*, *Parapenaeopsis acclivirostris* and *Penaeus semisulcatus*. In the second phase of the project in 1962, boats of 25ft (8-10 HP) was designed for operating

prawn trawls for the first time, which landed very high catch of prawns. Later 36 feet stern trawler with 48 HP engine was introduced. The INP vessels *Ashtamudi* and *Norind* reported *M. affinis*, *M. dobsoni*, *P. stylifera* and *P. indicus* from Kannur while exploring depths of 20 m. *Trachypenaeus curvirostris* was reported from 5-10 fathoms off Cochin. *M. monoceros* of 120 mm and *P. indicus* of 150 mm size were captured off Kollam and Kayamkulam during 1961 from 17-22 fathoms pointing towards the need for offshore exploratory survey. Demand for processed prawns from countries like USA and Japan soared, transforming prawns into an export commodity. The INP in 1963, wound up its fishery activities and handed over the extension programs to the Government of Kerala. Thus began mechanisation of crafts with assistance from foreign agencies and later to 1963, most of the developments in craft and gear were carried out by the Kerala State and Central Government organisations.

Growth phase

Single day trawl fishing

Mechanisation took momentum, with prawns becoming much sought after export commodity ensuing in large scale commercial trawling in the inshore waters. Up to 1970 the traditional sector was at the helm after which mechanised vessels took over. Commercial trawling for prawns prevailed during the pre and post monsoon months (January to April and September to December) until 1970. During the southwest monsoon (June to August) due to rough weather, fishing was only by the artisanal crafts and gears but in Cochin and Sakthikulangara, trawling was active during monsoon as these two harbours had developed the infrastructure facilities for the operation of mechanised vessels. The fishery was entirely based on small mechanised vessels 8-13 m powered by 25 to 95 HP engines. The vessels made single day cruises returning in the evening after 3 or 4 hauls, fishing up to a depth of 60 m during the monsoon months and to depth of 25 m rest of the months. The cod end mesh size of the gear was 25 mm. During 1969-71, *P. stylifera*, *M. affinis*, *M. dobsoni* and *P. indicus* formed 57.3% 18.8%, 13.9% and 10.0% respectively. Prawns were available in the catch throughout the year, the best season being July to September with catch rates of 85.17, 96.43 and 115.39 kg respectively. Commercial trawling at major centres - Sakthikulangara-Neendakara, Cochin and Calicut accorded substantially to the landings of inshore prawns in Kerala with 84770 t in 1973 and Neendakara contributing the bulk, with the single species *P. stylifera* caught during

southwest monsoon, providing 80% of the catch, also replacing *M. dobsoni* as the prime species in the prawn landings of the state. Ambalapuzha in the central part of the Kerala coast developed into an important prawn fishing centre during the early 70's, with introduction of mechanised trawlers. The region was also well known for the mud bank formations during the southwest monsoon. Prawn fishery here extended throughout the year, trawling from October to May and from June to September by indigenous gears. Prawn trawls of 18.5 m foot rope length 20 mm cod end mesh and traditional plank built boats operating seine nets (*thanguvala*) were common. Fishery was composed of *M. dobsoni*, *P. stylifera*, *P. indicus* with stray catches of *M. affinis* and *M. monoceros*.

Declining phase

P. stylifera recorded landings above 90% most of the years except during 1973, 1975, 1979 and 1982. During the early 1980's Neendakara was the most important harbour along the Kerala coast landing maximum quantity of prawns by mechanised trawlers and the fishery was exclusively for *P. stylifera*. During June to August of 1973 to 1982, Neendakara-Sakthikulangara recorded maximum prawn landings - 56750 t in 1975 and lowest 9,399 t in 1981. *M. dobsoni*, *M. monoceros*, *M. affinis* and *P. indicus* were the other species represented in the prawn fishery of the state. The prawn landings in Kerala declined considerably to 26684 t in 1985. Contribution of prawn fishery from Saktikulangara-Neendakara declined from 51% in seventies to 30% in eighties and 24% in nineties due to overfishing with both traditional and mechanised vessels operating in the same grounds and effort in terms of units being added almost every year to meet the demand of prawns in the export market.

Enhanced growth phase

Multiday and night fishing

The phase marked the introduction of night trawling and extension of fishing to deeper waters, leading to multiday trawl operations. Up to mid 1980's, trawling for prawns was confined to the near shore waters. Decline in prawn catch led to fishing at night during the early 1980's which later extended to the day. Trawlers voyaging for 7-9 days with navigational equipments were initiated. New species emerged from night trawling - *Penaeus canaliculatus*, *T. curvirostris*, *Megokris sedili*, *Metapenaeopsis mogiensis* and *Solenocera choprai*. Multiday trawlers ventured into deeper grounds catching *T. curvirostris*, *P. canaliculatus*, *S. choprai* in addition to *M. dobsoni*, *P. stylifera*, *P. indicus*, *M. monoceros*, *M. affinis*, *P. semisulcatus* and *P. monodon*. Prawn landings which had diminished during 1981, improved appreciably, peaking in 1994 (71871 t), with an average of 51665 t for the period. The phase besides adding species of prawns to the fishery replaced *P. stylifera* with *M. dobsoni* as the dominant species in the landings.

Stagnant phase

From 2002 prawn landings stagnated at around 35,000 to 40,000 t and in certain years going down beyond 30000 t. Comparatively, 2018 recorded high landings (50472 t) and lowest in 2014 (27463 t), average being 35697 t. Average landings of *M. dobsoni* during 2007 - 2020 was 20042 t with highest in 2018 (26014 t) and *P. stylifera* during the same period was 8410 t with highest landings in 2019 (14106 t). The reason for the stagnant state can be attributed to divergence of fishing for other market driven resources -fish and cephalopod and also perhaps decreased availability of

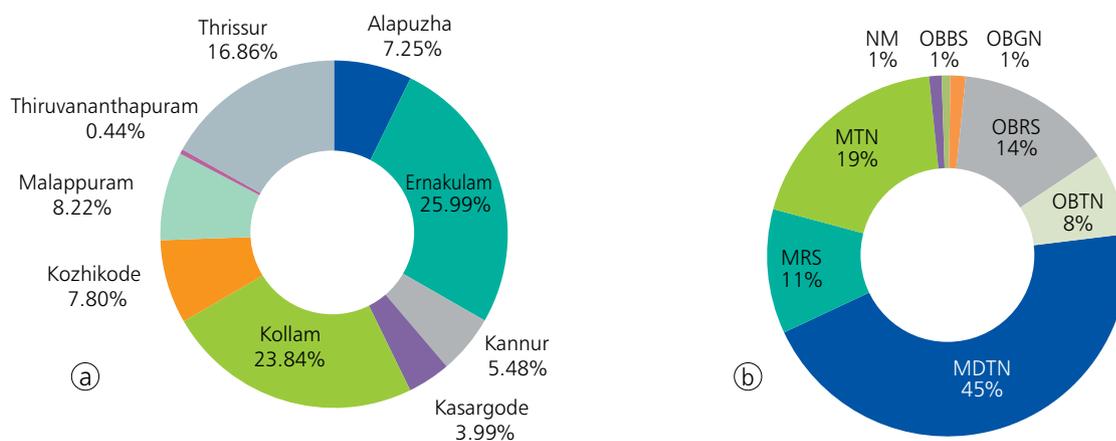


Fig. 2. Inshore prawn catch during 2013-2020 (a). District wise average catch (%) (b). Gear wise average catch (%)

prawn resources. During certain years' reduction in landings observed was due to reduced man-days at sea because of turbulent weather conditions/cyclone/pandemic. During 2013-2020, Ernakulam District recorded the highest catch of inshore prawns (25.99%) followed by Kollam (23.84%) (Fig. 2a). Multiday trawlers dominated in landing inshore prawns (45%), single day trawlers contributing 19% and other gears together (36%) (Fig.2b).

Species composition in trawler landings

During 1970 to 1980's, in single day trawlers *P. styliifera* was the dominant species, subsequently multiday trawling relegated *P. styliifera* to the second position, *M. dobsoni* occupying the first spot. But in Neendakara-Sakthikulangara *P. styliifera* continued to be in the prime position followed by *M. dobsoni* and during 1983-86, *T. curvirostris* was second to *P. styliifera*. During 1984-88, *P. indicus*, *M. dobsoni*, *M. monoceros* and *P. styliifera* formed the main components of the fishery. *P. styliifera* dominated (80-98%) during monsoon and *M. dobsoni* during pre-monsoon (45%) and post-monsoon (69.5%). In Kozhikode District, *M. dobsoni*, *P. styliifera* and *P. indicus* formed major fishery during 1978-1983. From 1984 to 1988, *P. styliifera*, *M. dobsoni*, *P. indicus* along with small quantities of *M. affinis* constituted the fishery. *P. styliifera* formed the bulk of the catch (64-79%). Till 1995 *P. styliifera* was the major prawn species in the fishery later replaced by *M. dobsoni*. *M. dobsoni* formed 37% followed by *P. styliifera* 34% and *T. curvirostris* formed a fishery from 2003 onwards, contributing 0.5 to 6.7% during 2003-2006. Other species in the fishery were *M. monoceros*, *M. affinis*, *P. indicus*, *S. choprai*, *P. semisulcatus* and *P. canaliculatus*. During 2007-2020, the average landings of *M. dobsoni* was 20042 t, highest in 2018 (26014) and *P. styliifera* during the same period was 8410 t with highest landings in 2019 (14106 t). *M. dobsoni* continued to dominate the inshore prawn fishery of Kerala during 2002-2020 followed by *P. styliifera*, *M. monoceros* etc. The species composition of inshore prawns from Kollam (Neendakara), Kochi (Munambam, Vypin) and Malabar (Malappuram, Kozhikode, Kannur and Kasargode) are depicted in Fig.3a-c.

List of inshore prawn species from Kerala

- *Metapenaeus dobsoni* (Miers, 1878)
- *Metapenaeus affinis* (H. Milne Edwards, 1837)
- *Metapenaeus monoceros* (Fabricius, 1798)
- *Parapenaeopsis styliifera* (H. Milne Edwards, 1837)

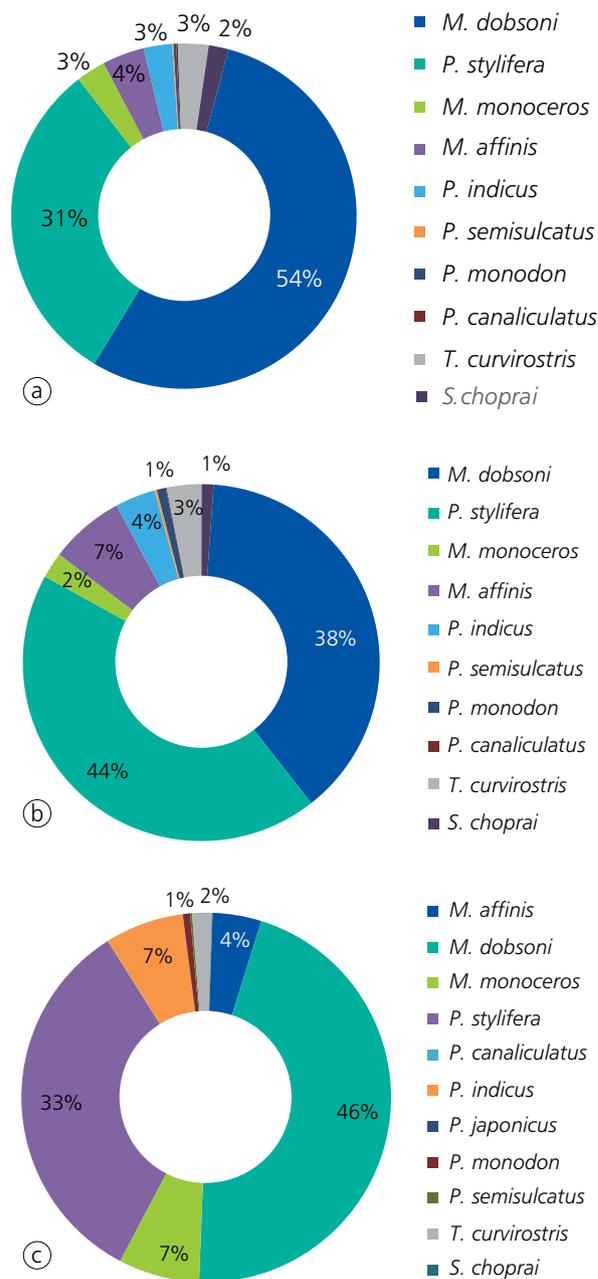


Fig. 3. Species composition of inshore prawns in landings by trawlers at (a) Kochi, (b) Neendakara during 2011-2020 and (c) Malabar during 2015-2020

- *Parapenaeopsis maxillipedo* Alcock, 1905
- *Parapenaeopsis uncta* Alcock, 1901
- *Penaeus indicus* H. Milne Edwards, 1837
- *Penaeus monodon* Fabricius, 1798
- *Penaeus semisulcatus* De Haan, 1844
- *Penaeus latisulcatus* Kishinouye, 1896
- *Penaeus canaliculatus* (Olivier, 1811)
- *Metapenaeopsis stridulans* (Alcock, 1905)

- *Metapenaeopsis toloensis* Hall, 1962
- *Trachysalambria aspera* (Alcock, 1905)
- *Trachysalambria curvirostris* (Stimpson, 1860)
- *Solenocera crassicornis* (H. Milne Edwards, 1837)
- *Solenocera choprai* Nataraj, 1945 (H. Milne Edwards, 1837)

Mini trawl fishery

Mini trawling was launched first in Alapuzha in 1987 mainly to target inshore prawns and fishermen in other coastal districts of the state too adopted the crafts. Initially made by cutting worn out canoes into two halves, later due to increased demand they were specially constructed. The 9 -10 m long net with 15-20 mm cod end and two small otter boards is employed for fishing within 10 m from the shore at depths of 15-20 m. During 1994-1997 *P. stylifera* was the predominant species (88-94%) in the mini trawlers from Alapuzha. *M. dobsoni*, *P. indicus* and *M. affinis* were caught in minor quantities. The gear was reported to effect recruitment overfishing of *M. dobsoni* and *P. stylifera*, reflected from the trawl landings of Neendakara-Sakthikulangara and Cochin.

Monsoon fishery

The ban on trawl fishing during southwest monsoon in Kerala commenced in 1988. Prior to the ban, trawl operations were carried out throughout the year with peak fishing operations during the southwest monsoon from June to August/September. During 1984-1988, fishery in the monsoon months was relatively poor in 1984 and 1985 and subsequently increased with the maximum catch (61.7%) in 1987. Mud bank associated with the southwest monsoon is a phenomenon unique to Kerala and usually reported from Purakkad to Thottapally region where boat seines/ring seines are mainly operated. The prawn fishery is composed of *M. dobsoni*, *P. stylifera* and *P. indicus* along with minor quantities of *M. monoceros* and *M. affinis*. Analysis of catch data during 1972 to 1979 revealed the highest catch of 4284 t during 1973 and least in 1979 (29 t) after which it progressively declined.

Estuarine/backwater fishery

Fishery for prawns is prevalent in the backwaters/estuaries of Kerala, where the juveniles of several prawn species spend a phase of their life and later return to the sea for spawning. The gears mostly used are cast net, fixed nets - stake net and Chinese dipnet which are operated

throughout the year. The species caught are mostly -

Penaeus indicus H. Milne Edwards, 1837
Penaeus monodon Fabricius, 1798
Penaeus semisulcatus De Haan, 1844
Penaeus canaliculatus (Olivier, 1811)
Penaeus latisulcatus Kishinouye, 1896
Metapenaeus dobsoni (Miers, 1878)
Metapenaeus monoceros (Fabricius, 1798)
Metapenaeus affinis (H. Milne Edwards, 1837)

In the Ashtamudi backwaters (Kollam), during 1980, catch in cast net constituted *P. semisulcatus* and *P. indicus* whereas more species (*P. indicus*, *M. dobsoni*, *M. monoceros* and *P. semisulcatus*) were recorded in stake net. Studies from stake net fishery in Vembanad during 2018-2019 revealed presence of *M. dobsoni*, *P. indicus*, *M. monoceros*, *M. affinis*, *P. semisulcatus*, *P. monodon* and *P. canaliculatus*. Developments in the marine fisheries sector of Kerala triggered by the INP in 1953 and a decade later taken over by the central and state government, revolutionised the sector from subsistence to profit driven. Many technological innovations and transformations happened over the years in the sector besides also enduring natural disasters - cyclones, flood and the recent COVID pandemic. The Kerala Marine Fisheries Regulation Act promulgated in 1980, the Kerala Marine Fisheries Regulation rules 2018, the monsoon trawl ban 1988, the MLS (Minimum Legal Size) in 2017, that includes four important species of inshore prawns (*M. dobsoni*, *P. stylifera*, *M. monoceros* and *M. affinis*) are measures the government periodically introduced to sustain marine fisheries of Kerala. In the initial phase of mechanised fishing operations inshore prawns dominated the landings and during the course of modernisation, other fishery resources such as finfishes and cephalopods were tapped. Though *M. dobsoni* was the major species in the primary phase, with advent of single day trawling *P. stylifera* took over. However, in the enhanced growth phase, *M. dobsoni* regained the topmost position and *P. stylifera* was relegated to the second position. Interestingly, *P. stylifera* still enjoys prime place in the inshore prawn landings of Neendakara-Sakthikulangara. In the future, prawn fishery management requires prudent measures to ensure sustainability of the resource as well as the livelihood of fishers.

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