MARINE FISHERY RESOURCES OF KERALA PRESENT STATUS AND SCOPE FOR DEVELOPMENT

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INTRODUCTION

The Western seaboards of most continents are known to have some of the world's highly productive fisheries. A significant element of these resources consists of clupeoid fishes with short food chains. We have the well known examples of the Peruvian anchoveta and the California sardine on the west coast of the Americas and the Pilchard on the south west coast of Africa. Kerala State, situated on the west coast of the Indian subcontinent (Lat. 08° 20' to 12°30') is also known for its fish wealth dominated by the oil sardine. The basic factor favouring the high productivity in all these areas is the phenomenon of upwelling and the production cycle triggered by this.

The State has a coast line of nearly 600 km, which is about one tenth of India's coast line. Among the maritime States, Kerala ranks first in marine fish production with a contribution of about one fourth of all marine fish produced in the country. Kerala has a continental shelf area of 38,700 km². The shelf is relatively narrow, the distance from the shore to the shelf edge ranging from about 30-50 miles, being narrow in the south and broad in the north. South of Quilon, the sea bottom is hard and quickly sloping and north of it muddy or sandy with gentle sloping seawards. The fish fauna also shows clear difference between the above two regions.

The number of active fishermen in Kerala is around 1.3 lakhs (CMFRI, 1981) which is about 30 percent of the total number of fishermen engaged in marine fishing in India. Kerala has about 26,000 non-mechanised traditional fishing crafts, dug out canoes, catamarans, and plank built boats and about 3000 mechanised ones including trawlers, gill netters and purse seiners. However during the last few years more and more traditional crafts are being fitted with outboard engines.

TRENDS IN MARINE FISH PRODUCTION

The average catch of marine fish in Kerala during the recent years (81-82 to 84-85) stood around 3.5 lakh tonnes. The landings by mechanised crafts was about one third of the total in the mid seventies. This has risen to about two thirds in recent years.

This change has been due to the commercial purse-seining for the small pelagic fishes, mainly oil sardine and inclusion of the catches of outboard engine fitted traditional crafts in the mechanised category. Incidentally the number of crafts fitted with out-board engines increased from about 1000 in 1982 to about 5000 by 1986.

While it may not be very apt to allot a mobile resource like fishes to limited geographical areas, the average picture of marine fish landings of Kerala (1982-1984) shows that the Quilon District accounts for the maximum 28%, followed by Trivandrum 14.6%, Alleppey 11.4%, Ernakulam 11%, Malappuram 10%, Cannanore 9.5%, Kozhikode 7.8% and Trichur 7.6%.

Prawn catches are highest in Quilon District followed by Cannanore and Ernakulam Districts. Maximum oil sardine catches were also noticed in the Quilon District followed by Alleppey, Ernakulam, Malappuram, Cannanore, Kozhikode and Trivandrum in that order.

Anchovies including whitebaits were caught maximum in Trivandrum District followed by Alleppey, Quilon, Malappuram, Trichur, Kozhikode, Ernakulam and Cannanore in that order.

EXPLOITED RESOURCES

Of the exploited resources of marine fishes in Kerala, about 70% are contributed by pelagic species and the rest by demersal species including prawns.

3.1 Pelagic resources

Oil sardine

The oil sardine (*Sardinella longiceps*) is the single species contributing about 40% of all the marine fish catch of the State. The average catch of this in Kerala during the recent years (1982-85) was of the order of 1.3 lakh tonnes. Recent catch trends show that nearly 75% of all oil sardine landed in India are from Kerala. These fish, which by and large, are caught by the traditional fishermen in their boat seines are now exploited also by the purse-seines.

Whitebaits

The average annual landing of whitebaits (*Stolephorus* spp.) in Kerala in recent times (1982-85) was a little over 36,000 t., which is about 10% of the total marine fish landed in the State during the period. On an all India basis, Kerala accounted for more than half of the whitebait catch in the country. The major species sustaining this fishery are *Stolephorus devisi, S. bataviensis, S. buccaneeri* and *S. macrops*. The acoustic survey coverages made by the UNDP/FAO Pelagic Fishery Project, between October 1972 and August 1973 indicated a high average standing stock 1,80,000 t. of whitebaits off Kerala coast (8°-12° Lat. N), (Menon and George, 1975). Maximum abundance was found during the May-June period. It would appear from the current landings that whitebaits are very much under-exploited.

The Indian mackerel

The mackerel fishery in Kerala is sustained by a single species (*Rasterlliger kanagurta*) and contributes to about 30% of the All India Catch. The mackerel is accepted as a common man's table fish in Kerala. As a fluctuating resource, it plays a

sensitive role along with oil sardine in the stability or otherwise of the total catch of marine fish in the State. During 1982-85 period, the annual average catch of mackerel in Kerala was of the order of 13,000 t. This was nearly 4% of the total marine fish landed in the State annually.

Tunas

On an all India basis, tunas remain to be one of the least exploited resource. Coastal tunas sustain a good traditional fishery particutarly in south Kerala and the recent progress in mechanisation and drift gill netting at centres like Cochin has helped to increase the tuna catches at these centres. However, the landings during the last few years (1983-85) show an average annual catch of about 7,000 t. which is just 2% of total fish annually caught in the State. Little tuna (*Euthynnus affinis*), and frigate mackerels (*Auxis* spp.) are the main species landed in the State. Other species caught in small numbers in the drift gill net fishery, especially at Cochin are the long tail tuna (*Thunnus tonggol*), Oriental bonito (*Sarda orientalis*) and skipjack (*Katsuwonus pelamis*).

Carangids

A variety of carangids including horse mackerel (*Megalaspis cordyla*), scads (*Decapterus* spp.) and trevallys (*Caranx* spp.) are caught in Kerala. Their contribution to the State's average annual catch is about 14,000 t., which works out to just 4% of the total catch (82-85). The Pelagic Fishery Project (Rao *at al.*, 1977) estimated the average standing stock of horse mackerel and scads along the Kerala coast and put it at over 70,000 t. This is therefore another underfished resource which the State can exploit with advantage.

Ribbon fishes

About 25% of all ribbon fish landed in India is in Kerala. The ribbon fishes contributed on an average, about 11,000 t. to Kerala's marine fish landings during the 1982-85 period. This is about 3% share in the marine fish catches of Kerala. *Trichiurus lepturus* is the dominant species contributing to the catch in Kerala. The ribbon fish potential off Kerala coast is considered to be at least 3 times the average catch presently made.

Seer fishes

The seer fishes, mainly *Scomberomorus commersoni* and *S. guttatus* contributed on an average (82-85) 6000 t to the fish catches of the State. The landings show an upward trend due to the increasing numbers of mechanised drift/gill netters introduced in recent years.

The lesser sardines and other clupeids like white sardine and anchovies and the pomfrets are the other pelagic resources contributing to the State's fish wealth.

Lesser sardines contribute to good fishery south of Alleppey during August-December period. *Sardinella gibbosa, S. dayi* and *S. sirm* are the main species caught. In northern Kerala, *S. gibbosa, S. dayi* and *S. fimbriata* are more often caught.

The fishery has been showing wide fluctuations in recent times. The 1973-77 period saw very good catches. The catches have been very modest during the last few years (1982-85) with a contribution of about 1.5% to total marine fish catch of Kerala.

Other clupeids like the white sardine (*Escualosa thoracata*) and anchovies (*Thrissocles* spp.) together contribute an equal quantity to the catches.

Pomfrets

Mainly two species of pomfrets, the silver pomfret (*Pampus argenteus*), and the *Formio niger*) are caught seasonally along the Kerala coast but the catches of these highly esteemed table fish have been rather modest being of the order of an average annual catch of 2000 t in recent years (1982-85). It is noteworthy here that a large number of very young pomfrets are caught in shrimp trawls and virtually get destroyed before they can grow to adult sizes and enrich the stock.

3.2 Demersal resources

The exploited demersal resources consist of several fin fishes and shell fishes, especially penaeid prawns as well as small quantities of squids and cuttle fishes. The cat fishes, flat fishes, threadfin breams, croakers, lizard fishes, silver bellies, and elasmobranchs are the important fin fishes caught along Kerala coast.

Cat fishes

Cat fishes form one of the dominant demersal fishes caught off Kerala with an average catch of over 12,000 t (1982-84) which is 25-30% of the all India catch. Species of the genus *Tachysurus* sustain this fishery. The Pelagic Fishery Project, Cochin, found the highest biomass of catfish off Kerala coast during their surveys along the south west coast (Anon, 1976 a). April to September period is the best month for this fishery in Kerala. Recently there have been incidents of large catches of incubating cat fish, mainly *Tachysurus tenuispinis* off Karnataka coast which can directly affect the stock abundance of the species in succeeding years. A timely alert has been given to the concerned state on this matter by the CMFRI.

Flat fishes

The flat fishes, especially the well known Malabar sole, *Cynoglossus macrostomus* is a major contributor to the demersal fish catches of Kerala. Restricted by and large to the northern part of the State, the Malabar sole is caught in very large quantities for brief periods after the southwest monsoon in the area. The average annual landing of flat fish during the 82-84 period has been about 14,000 t.

Thread fin bream

Kerala State accounts for about 35% of the catch of the thread fin breams landed in India. Mainly one species, *Nemipterus japonicus* contributes to the good catches made by the shrimp trawlers in July-September period. These fishes are found in relatively deeper grounds and are abundant in the 75-125 m depth range, 75% of the

catch coming from the above depth range. The annual average catch of the fish (1982-84) is of the order of 12,300 t. The present exploitation of the fish should be considered as marginal and there appears to be good scope for increasing the production of this fish from deeper waters off Kerala.

Croakers

A recent study of the catch trend of sciaenids (Mahadevan Pillai and Dharmaraja, 1986) shows that Kerala contributes about 10% to the all India catch of sciaenids, the annual average catch of Kerala being about 7,000 t (1966-1984). The croakers caught in Kerala mainly belong to the genera *Johnieops* spp., *Johnius* spp., *Otolithes* spp. and *Pennahia* sp.

Lizard fishes

These fishes (*Saurida* spp. and *Saurus* sp.) are brought in by the shrimp trawlers. On the average nearly 6,000 t are caught in Kerala in recent years (1981-85).

Silver belly

The average annual catch of silver bellies (*Leiognathidae*) in Kerala is of the order of 5,500 t (1982-85). Mostly they are caught in the shrimp trawls from coastal waters.

Elasmobranchs

Elasmobranchs (sharks, skates and rays) constitute a more or less steady component of the demersal fish catches of Kerala and on an average (81-85) about 6-7 thousand tonnes of these fishes are landed annually. Some scope for increasing the catches of sharks exists along with the development of long line fishery for oceanic tunas from Kerala bases.

Prawns

The penaeid prawns which sustain the marine products export trade in the country is under great fishing pressure along the Kerala coast. There has been evidence of some overfishing of this resource in certain pockets of Kerala. The main species caught are *(Penaeus indicus, Metapenaeus dobsoni, M. monoceros, M. affinis* and *Parapenaeopsis stylifera.*

The annual average catch of penaeid prawns along Kerala coast in recent years (1981-84) is of the order of 28,500 t. The controversial monsoon fishing for 'Karikadi' prawn (*P. stylifera*) at Neendakara contributes a good part of this catch.

Cephalopods

Squids and cuttle fishes which have a ready export market are presently under exploited. The catch statistics show an average annual catch of about 3,200 t of cephalopods in Kerala (81-84).

The squid *Loligo duacelli* and few species of cuttle fish (*Sepia*) are commercially important. The oceanic squid *Symplectoteuthis oulaniensis* is reportedly quite abundant

on shelf edge and slope of the west coast (Silas, 1969) at depths beyond 180 m. Kerala based offshore fishing vessels could harvest these cephalopod resources aiming at the lucrative export market for this commodity.

THE MUD BANK FISHERIES

A uniqe type of fishery not encountered elsewhere in the country for miscellaneous inshore fishes and prawns is conducted in certain localities of the Kerala coast, when mud banks are formed during the south west monsoon period. These mud banks are mainly noticed between Thottappally-Punnapra, Narakkal-Chellanam, Nattika-Valappad, Parappanangadi-Tanur and Beypore-Quilandy sectors of Kerala coast. The sea over the mud banks become unusually calm compared to the very rough conditions all around. The traditional fishermen as well as the shrimp trawlers make bumber catches of prawns, sardines and shallow water miscellaneous species of fishes which aggregate over the calm waters of the mud banks.

POTENTIAL RESOURCES

There are several underexploited or altogether commercially unexploited fish and shell fish resources off the SW coast of India which Kerala State can advantageously exploit from the shore bases. Large stocks of carangids, particularly horse mackerel and the scads, whitebaits, ribbon fish and cat fish are reported by the recent surveys in the midshelf and beyond along the west coast (Anon, 1976 a, b, Bapat *et al*, 1979). A portion of this could be easily exploited by extending fishing operations for these species by Kerala based vessels.

'Kalava' (*Epinephelus* spp.) resources revealed by the exploratory handlining and trap fishing by the Integrated Fisheries Project along rock outgrowths of the mid shelf of the SW coast are available for commercial exploitation from Kerala bases.

The coastal shrimp trawling and exploratory fishing operations in the deeper shelf off Kerala in the last three decades showed the presence of large resource of threadfin bream. The exploratory fishing activity of the larger boats of the Govt. organisations for ground fishes again indicated the presence of several deep water trawlable grounds on the deep shelf and slope as well as on the Quilon Bank yielding large quantities of fishes such as 'Bulls eye' (*Priacanthus* sp.), Indian drift fish (*Centrolophus* sp., *Psenes* sp.), 'Green eye' (*Chloropthalmus* spp.), penaeid and non-penaeid deep sea prawns, deep sea lobster (*Peurulus sewelli*) and a variety of other deep water fishes (Silas 1969; James *et al*, 1986). These resources however, have not yet been exploited commercially and as such are open for exploitation. The perch resources of the Wadge Bank can also be exploited by Kerala based deep sea trawlers. However, the commercial exploitation of deep water resources requires large boats and gears and additional infrastructure for handling, storage and marketing. Apart from the deep water ground fishes, the large oceanic pelagic tunas, especially yellow fin and the big eye, sharks and the bill fishes constitute large resources available for exploitation. These have to be harvested by long-lining or purseseining by vessels larger than the presently used inshore mechanised vessels. Development of deep sea harbours is a prime necessity to accommodate the larger vessels involved in the offshore operations.

RECENT DEVELOPMENTS

Apart from the introduction of small numbers of purseseiners and good numbers of mechanised drift/gill netters the significant event has been the wide spread use of outboard engines on traditional crafts. This has happened particularly in the southern parts of the state and there is tangible evidence of improvement in the per unit catches of these crafts. However, it would appear that even with this revolution there is little scope of big increase in fish production from the traditionally fished inshore areas within 50 m depth. The mechanised drift/gill netters are however contributing to increased catches of coastal tunas, seer fishes, cat fishes, sharks, etc. The immediate need appears to be the extension of fishing activities beyond the traditional fishing grounds so as to cover the under-exploited and unexploited resources revealed by exploratory surveys.

WATER POLLUTION IN COASTAL AREAS AND POSSIBLE IMPACT ON FISHERIES

With the increasing urbanisation and industrialisation, the discharge of untreated or partially treated sewage and industrial wastes along with wash out of agricultural pesticides into the sea pollute the marine environment. The fish mortalities in the Chaliyar river and in the Periyar estuary due to industrial effluents are by now well known. The major coastal pollution reported in recent times is from the Trivandrum coast, originating from the Titanium factory located in the area. Strict vigil on coastal pollution is to be maintained to safeguard our marine resources.

THE TRADITIONAL VERSUS MODERN AND THE SOCIAL CONFLICTS

In the process of development of the fishing sector in the last decade, social conflicts surfaced in some regions including Kerala.

Introduction of purseseining particularly held the prospects of diminished returns to the traditional fishermen of Kerala engaged in fishing for the coastal pelagic fishes. In this context the Central Marine Fisheries Research Institute took up a study of the impact of purseseining particularly for oil sardine in Kerala (Silas, *et al.*, 1982). At the time of the study there were only 60 purseseiners operating in Kerala. The study indicated that at the present level of exploitation and availability there is no tangible adverse impact on the traditional fishery.

A study of the influence of mechanised fishing on the socio-economic conditions of fishermen of Sakthikulangara was also conducted by CMFRI (Sathiadas and Venkataraman, 1981). It was found that, in general, mechanisation has increased fish production and income of the concerned fishermen. However, this process has got to involve and uplift more of the poorer section of the fishermen.

THE KERALA MARINE FISHERIES REGULATION ACT 1980

In the context of social conflicts on the issue of fishing by mechanised crafts in the near shore waters, Kerala Government promulgated the Kerala Marine Fisheries

Regulation Act, 1980. In this act, the coast line has been divided into two sectors, a southern sector, 78 km from Kollengode to Edava and a northern sector, 512 km length from Paravoor south to Manjeswaram. In the southern sector, a distance upto 16 fathom depth line from shore and in the northern sector a distance upto 8 fathom depth line has been exclusively reserved for the traditional crafts and all types of mechanised boats have been prohibited from fishing in this area. In the second bathymetric division which is the area upto 20 fathom line in the southern sector and 10 fathom line in the northern sector fishing by all mechanised boats except motorised country crafts have been prohibited. In the third division, which is up to the 35 fathom line in the southern sector and the 20 fathom line in the northern sector fishing by mechanised vessels of 25 gross registered tonnage and above have been prohibited. Since October 1983, Government has also prohibited the use of bottom trawl with less than 35 mm mesh size.

While demarcation of areas for different types of fishing crafts is meant to protect the interest of the traditional fishermen, the regulation of mesh size of trawl gears has a conservation angle.

In the situation obtaing in our country, voluntary observation of the specified area rule by the fishermen is a remote possibility and strict enforcement of these rules by Government is also beset with practical difficulties. These rules may attract modifications when further mechanisation of fishing craft takes place.

ROLE OF RESEARCH

With regard to the role of research in the development of marine fisheries in Kerala or elsewhere in the country, it may be stated that the marine fish resources from open waters cannot be raised to substantial levels through adoption of any known technology. All that can be done is to carry out studies on the parameters that contribute to fluctuations in availability and to use this information for long or short term forecasts of the fisheries, and also render advice for optimum harvest of the resources.

SCOPE AND STRATEGY FOR DEVELOPMENT OF MARINE FISHERIES OF KERALA

It has already been explained that about 70% of all fish landed in Kerala are pelagic species and the rest demersal including the prawns. Traditional fishing is practiced normally within the 50 m depth line and the fish populations outside this limit are therefore not subjected to any significant fishing pressure. It has been the considered opinion that increase in fishing effort in the traditionally fished zone can only marginally increase the catches. Shrimp trawling on the south-west coast during the last three decades shows that the effort increase can only increase the catch up to a point and beyond that signs of economic overfishing or even biological overfishing will tend to be expressed.

The options for development could be suggested on the following lines :

Firstly, marginal increase in the catches of traditionally fished stocks could be achieved by increased pace of motorisation of country crafts and adoption of gears of

better design and operational efficiency to match the improvement of the crafts. Expanding the mechanised gill net fishery in selected areas for coastal tunas, seer fish, pomfrets, etc. will augment supply of these valued table fishes.

Secondly, exploitation of the underfished conventional pelagic and columnar resources like horse mackeral, scads, whitebaits and ribbon fishes, of which a large part is distributed over the mid shelf, will yield substantial catches.

Thirdly, exploitation of the different demersal, columnar, meso-and bathypelagic communities of fishes and shell fishes and cephalopods on the deeper shelf and slopes off the Kerala coast would contribute substantially to the food fish as well as, industrial fish catches. Here the resources of threadfin bream, 'Bulls eye', 'Green eye' Indian drift fish, boar fishes, the rock cods, the diverse species of penaeid and non-penaeid prawns of the slopes and the deep sea lobster *Peurulus sewelli* would form the core components.

Vessels operating from the Kerala bases, particularly the central and south zones could exploit the Wadge Bank perches, the Quilon Bank lobsters and the 'Kalava' on the rocky chain of outgrowths of the outer shelf.

Lastly, the resources of the oceanic pelagic species of larger tunas like yellowfin and bigeye along with associated bill fishes and sharks could form target species for exploitation from the Kerala based vessels.

While the above suggestions are to be gradually implemented, a close watch on the impact of these on the stocks of fishes, particularly the conventional ones has to be maintained by both the research and developmental agencies.

If development in harvesting additional resources in one or more of the above suggested lines takes place, it is imperative that the shore infrastructure has to be built up to handle the increased catches by way of construction of deep sea harbours, storage, processing and marketing facilities.

Such integrated facility, one each for north zone, central zone and south zone with orientation of the infrastructure to the types of catches expected to be landed in those zones is envisaged. While a comprehensive central facility could be maintained at Cochin, infrastructure built up at Vizhinjam and a centre like Beypore or Cannanore should serve the south and north zones respectively.

When actually implemented, the points raised above will have to be looked into in depth, but for the present, it is hoped that they will stimulate further thinking on the crucial issue of development of the marine fisheries of Kerala.

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