

Marine Fisheries Research and Management

Editors

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Marine fish production and export marketing trend in Kerala - an economic analysis

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ABSTRACT

Though the marine fish production has considerably increased over the years, the economically backward traditional fishermen in the nonmechanised sector has been highly marginalised with enhanced mechanisation and motorisation of the fishing units. In spite of the increase in fleet size and decrease in the catch rates, the mechanised and the motorised sectors still sustain mainly due to the increase in the price of almost all the varieties of fishes. The present study was carried out in Kerala coast during 1995-96, to assess the sectoral contribution of marine fish production, export trend of marine products and economics of prominent craft gear combinations. Production trend clearly indicates a declining catch of oil sardine and catfish in recent years and marked improvement in the production of penaeid prawns and cephalopods. More than 20% of the marine products exported from India are from Kerala and the forex earnings by the state during 1994-95 was Rs. 816.64 crores. The need for giving emphasis for product development and value added products has been stressed to improve our forex earnings. Almost all type of fishing units operating along Kerala coast are found to be economically viable.

Introduction

Marine fisheries play a pivotal role in the economy of the coastal fisherfolk of Kerala. Currently the State's share is over 5 lakh tonnes of marine fish per annum and stands first among the maritime States of India in fish production. With a coastline of 590 km, Kerala is having 304 fishing villages and 222 landing centres. There are about 7 lakh marine fisherfolk in the State, of which 20% are active fishermen. The labour-intensive traditional fishing techniques are slowly vanishing from the Kerala Coast. Mechanised fishing

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has been introduced first in Kerala during the late fifties under the erstwhile Indo-Norwegian project and it has since then spread to other States. Although mechanisation paved the way for increased landings and the development of an organised seafood industry in the country, it has marginalised the traditional fishermen who have gone for rapid motorisation of their country crafts. However, the increase in fishing pressure led to lesser catch rates to all types of fishing units. In spite of the declining catch rates the fishing units could continue the operation at a sustainable level only due to substantial increase in the price of almost all the varieties of fish over the years. However conflicts among different segments of fishermen now-a-days have become a routine affair. Economic analysis of the marine fisheries will provide vital information for framing appropriate policies for the balanced and sustainable development of the marine fisheries in the State. In this context the present study is taken up in Kerala with the following specific objectives.

- To review the marine fish production trend with special emphasis on the contribution of mechanised, motorised and non-mechanised sectors.
- To examine the export trend of marine products from Kerala.
- To assess the economics of operations of different craft-gear combinations.

Materials and methods

Both primary and secondary data have been collected and used for the present study. The secondary data pertaining to the marine fish production over the years by different sectors have been collected from the publications of the Central Marine Fisheries Research Institute (CMFRI) and the export data from the Marine Products Export Development Authority (MPEDA).

The costs and earnings data of different craft-gear combinations were collected from Kollam region during 1995-96. Among 9 maritime districts of Kerala, Kollam is one of the predominant districts in fish production due to the location of Neendakara Fisheries Harbour. Hence, Kollam District is purposely selected for collecting the costs and earnings data. Kollam has 37 km of coastline, 29 fishing villages and 33 fish landing centres. The costs and earnings data were collected from 10 units in each category of craft-gear combination for 10 selected days in every month at sample centres of Kollam

District. Information regarding the quantity and value of different species caught in the units, wages to labourers, fuel expenses, auction charges, expenses on repair and maintenance and other operational expenditures and gross revenue received per trip were collected from the sample units for a period of one year.

Marine fish production in Kerala

About 5000 mechanised units, 8000 motorised units and 27,000 non-mechanised units are engaged in marine fishing activities in Kerala. The fish production has increased considerably over the years from 3.8 lakh tonnes during 1983 to 5.3 lakh tonnes during 1995, with the maximum of 6.6 lakh tonnes recorded during 1990 and the minimum of 3.0 lakh tonnes during 1987. The production from the non-mechanised sector has drastically reduced from 49% in 1983 to a mere 4% in the current year (1995). On the other hand catch by the mechanised sector increased considerably from 25 to 54% and the motorised sector from 26 to 42% during the same period. Production from the non-mechanised sector was about 1.9 lakh tonnes during 1983 and this has drastically reduced to 0.2 lakhs tonnes during 1995.

The catch from the mechanised sector has gradually increased over the years from 0.98 lakh tonnes during 1983 to 2.2 lakh tonnes during 1995 (Table 1). The maximum production of 3.2 lakh tonnes was recorded during 1994. In the motorised sector also the catch has increased from 0.99 lakh tonnes during 1983 to 2.9 lakh tonnes during 1995 with the maximum catch of 4.0 lakh tonnes recorded in 1989. The average catch per fishing unit per annum works out at 43 t for mechanised units, 0.7 t for non-mechanised units and 36.3 t for motorised units during 1995.

The species composition of the marine fish landings in Kerala for 1985, 1990 and 1995 is given in Table 2. The importance of oilsardine in the economy of the marine fisheries sector in Kerala is explicitly known from the catch composition.

The oilsardine and other clupeids form about one third of the total fish production. The oilsardine alone contributes to more than 25% of the catch, the availability of which regulates the increase or decrease in the production trend. The other major groups contributing to the fishery are the carangids, mackerel, perches, tunas, ribbonfishes, lizardfishes, crustaceans (mainly

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Table 1. Estimated marine fish landings(tonnes) in Kerala by mechanised, motorised and non-mechanised sectors (1983-1995)

(Figures in brackets indicate percentage)

Year	Mechanised	Motorised	Non-mechanised	Total
1983	98070 (25)	99082 (26)	188128 (49)	385280
1984	129641 (33)	133313 (34)	129939 (33)	392893
1985	120942 (37)	127469 (39)	77125 (24)	325536
1986	129785 (34)	186282 (49)	66724 (17)	382791
1987	151636 (50)	111726 (37)	39924 (13)	303286
1988	205916 (44)	230400 (49)	32492 (7)	468808
1989	213729 (33)	400231 (62)	33566 (5)	647526
1990	231572 (35)	388624 (59)	42694 (6)	662890
1991	219681 (39)	305196 (54)	39284 (7)	564161
1992	256838 (46)	273805 (49)	30099 (5)	560742
1993	308636 (54)	230883 (40)	35220 (6)	574739
1994	325282 (57)	221295 (39)	21457 (4)	568034
1995	221851 (42)	290421 (54)	19374 (4)	531646

penaeid prawns), and cephalopods (squids and cuttlefishes). The overall increase in the fish production during 1985 to 1995 was mainly due to the increase in the landings of carangids, crustaceans, (penaeid prawns, lobster and crabs), cephalopods (squids and cuttlefishes), mackerel, lizardfishes and barracudas. The carangid landings had an eight-fold increase from 0.13 lakh tonnes during 1985 to 1.02 lakh t during 1995. The crustacean landings have improved from 0.36 lakh tonnes during 1985 to 0.57 lakh tonnes during 1995. The production of squids and cuttlefishes had a five-fold increase from

Table 2. Catch composition of marine fish landing(tonnes) in Kerala during 1985, '90 and '95

Name of fish	1985	1990	1995
Elasmobranchs	5972	6968	4109
Eels	3	31	244
Catfishes	5170	2739	308
Oilsardine	79225	179276	13328
Other sardine	2473	12900	46131
Other clupeids	42378	38543	52260
Bombay-duck	-	-	-
Lizardfishes	6300	11469	12581
Half-beaks and full-beaks	664	631	3574
Flyingfishes	-	-	4
Perches	30649	67356	47621
Goatfishes	100	6919	174
Threadfins	156	2	14
Croakers	8624	10868	9979
Ribbonfishes	25142	9751	4641
Carangids	12839	69068	102762
Silverbellies	3417	6195	4005
Big-Jawed jumper	1041	2340	561
Pomfrets	890	2598	1675
Mackerel	18101	78335	78515
Seerfishes	8459	5372	5910
Tunnies	9850	32615	10977
Billfishes	155	245	111
Barracudas	898	3842	4677
Mulletts	716	39	701
Unicorncod	-	12	-
Flatfishes	11332	15427	12385
Crustaceans	35770	67340	57106
Molluscs	8283	24206	43942
Others	6929	7803	13352
Total	325536	662890	531646

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0.08 lakh tonnes during 1985 to 0.44 lakh tonnes during 1995. The mackerel landing has recorded a four-fold increase from 0.18 lakh tonnes during 1985 to 0.79 lakh tonnes during 1995. The lizardfish landings have a two fold-increase from 0.06 lakh tonnes during 1985 to 0.13 lakh tonnes during 1995. The peak annual landings of 6.6 lakh tonnes in 1990 was mainly due to the bumper catch of oil-sardine which constituted about 27.0% of the annual production. The increase in the production of other species like the crustaceans, cephalopods, mackerel, carangids, perches and lizardfishes also contributed substantially to the peak annual landings in Kerala during 1990. This overall improvement in the production of both pelagic and demersal varieties may be due to the wide spread motorisation of the country crafts during that period.

Another interesting feature noticed recently is the complete disappearance of the oilsardine and the catfish from the fishery. The percentage of oilsardine in the total catch had declined from 27.0 during 1990 to 2.5 during 1995. The catfish landings of 5170 t during 1985 has come down to a meagre 308 t during 1995 and the decline in the production of certain species like ribbonfish, seerfish and threadfins over the years is significant. The landings of ribbonfish has reduced from 0.25 lakh tonnes during 1985 to 0.05 lakh tonnes during 1995. The seerfish landing had decreased from 0.09 lakh tonnes during 1985 to 0.06 lakh tonnes during 1995. The threadfins have reduced from 156 t during 1985 to 14 t during 1995. The indiscriminate fishing during the spawning season is attributed to the reduction in the recruitment of most of the above said varieties.

Export trend

More than 20% of the marine products exported from India are contributed by Kerala. Though Kochi continues to be the largest seafood exporting port in India, Thiruvananthapuram is also emerging as one of the major outlets for the export of live and chilled seafoods from the country. Shrimp is the major seafood exported from Kerala (45-50%) followed by the cephalopods (Squids and cuttlefishes 38-40%), fresh and frozen fish (10%) and items like lobster-tail, frozen clams, dried fish, freeze dried shrimps and others as shown in Table 3.

Though there was a fall in the States quota of marine product exports, from 34.19% of 1991-92 to 23.49% during 1992-93 in all India level, the

total quantity exported from the State has improved from 58743 t during 1991-92 to 74625 t during 1994-95. This would have increased further if the aquaculture sector would not have been adversely affected by the recent outbreak of the viral disease throughout the country.

The export of frozen cuttlefish filets has improved from 5287 t during 1991-92 to 12203 t during 1994-95. The quantity of frozen squids has also improved from 11144 t during 1991-92 to 15988 t during 1994-95. The quantity of fresh/frozen fish has gone up from 2656 t during 1991-92 to 7221 t during 1994-95. The export of other items which includes live materials like mud crabs, ornamental and other fishes has improved from 1201 t during 1991-92 to 3923 t during 1994-95.

The export earnings from Kerala have also increased considerably from Rs. 444.47 crores during 1991-92 to Rs. 816.64 crores during 1994-95. The earnings from frozen shrimps have increased from Rs. 339.26 crores during 1991-92 to Rs. 499.44 crore during 1994-95. The earnings from cephalopods (squids & cuttlefishes) have increased from Rs. 78.29 crores during 1991-92 to Rs. 230.13 crores during 1994-95. The income from finfishes has improved from Rs. 9.48 crores during 1991-92 to Rs. 26.79 crores during 1994-95. The income from freeze dried shrimp has gone up from Rs. 2.85 crores to Rs. 19.07 crores during the above period. The earnings from other items have also improved from Rs. 4.24 crores to Rs. 33.66 crores during 1994-95. The export trend clearly indicates a decline in the exports of frozen shrimp for the last few years. The increase in earnings from the export of frozen prawns is mainly due to the devaluation of Indian currency and consequent high conversion rates. In shrimp exports, more emphasis should be given for product development and sending more value added products in our own brand names to increase our export earnings. However, there was substantial improvement in product diversification and the exports of almost all items like squids and cuttlefishes, clam and live fishes.

Economic performance of fishing units

For the purpose of economic evaluation of different types of marine fishing methods, the marine fishing sector has been classified into three distinct groups.

1. Mechanised sector using inbuilt engine of 50-120 HP.

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Table 3. Export trend of marine products from Kerala (1991-92 to 1994-95)

Major items	1991-92	1992-93	1993-95	1994-95
1. Frozen shrimp	Q. 36761	24155	31608	33742
	V. 339.26	263.70	405.72	499.44
2. Frozen lobster tail	Q. 209	115	55	130
	V. 5.77	3.25	1.66	1.94
3. Fr.cuttle fish fillets	Q. 5287	7631	7780	12203
	V. 28.09	53.82	66.16	115.49
4. Fr. squid	Q. 11144	11422	17612	15988
	V. 50.20	62.49	101.87	114.64
5. Fresh/frozen fish	Q. 2656	4203	4270	7221
	V. 9.48	16.80	17.43	26.79
6. Dried items	Q. 69	49	2	89
	V. 0.28	0.17	0.03	0.93
7. Frozen clam	Q. 1374	736	726	1136
	V. 4.30	2.35	1.98	4.68
8. Freeze dried shrimp	Q. 42	74	85	193
	V. 2.85	6.10	8.90	19.07
9. Other items	Q. 1201	709	1710	3923
	V. 4.24	5.57	18.46	33.66
Total	Q. 58743	49094	63848	74625
	V. 444.49	414.25	622.12	816.64
All India	Q. 171820	209025	243960	307337
	V. 1375.89	1768.56	2503.62	3575.27
All India%	Q. 34.19	23.49	26.17	24.28
	V. 32.30	23.42	24.85	22.84

Q: Quantity in tonnes V: Value in Crores(Rs)

Source: Marine Products Export Development Authority, Kochi.

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2. Motorised sector using traditional craft with outboard engines of less than 50 HP.
3. Non-motorised artisanal sector using country crafts with traditional gears.

Mechanised sector

Data on the catch particulars and revenue details for the mechanised trawler was collected from the Neendakara Fisheries Harbour from April 1995 to March 1996.

The quarterly average catch and revenue of a trawler operating from Neendakara Fisheries Harbour is given in Table 4. All the units operating from here are single day fishing units and the average annual fishing days is about 225. The fishing days are minimum in July - September due to the ban on mechanised fishing during the monsoon period. The quarterly catch ranges from 12276 kg during April - June to 14490 kg during October - December period. The gross earnings range from Rs. 1.89 lakhs during April - June to Rs. 2.37 lakhs during July - September. About 18% of the catches in trawlers are the prawns and the remaining 82% are the finfishes and the revenue realised from prawns and finfishes is 46% and 54% respectively.

Table 4. Average catch (kg) and revenue (Rs) of trawlers (32'-36') operating at Neendakara Fisheries Harbour (1995-96)

	April- June	July - September	October December	January March	Annual
Average fishing trips	62	40	63	60	225
Total catch	12276	13440	14490	12720	52926
Total revenue	189224	237350	215176	165360	807110
Catch per trip	198	336	230	212	235
Revenue per trip	3052	5933	3415	2756	3587

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The average operational costs of a trawler operating from Neendakara Fisheries Harbour is given in Table 5. The average annual operational cost comes to about Rs. 5,83,200 as against gross earnings of Rs. 8,07,110. Fuel expenditure and wages for fishing labourers are the major items constituting about 85% of the variable costs. The average catch per trip of trawlers works out at 235 kg comprising 42 kg of prawns and 193 kg of fishes. The average gross earnings per trip works out at Rs. 3587. The net operating income per trip comes about Rs. 995 and the average annual income comes about Rs. 2.24 lakhs.

Motorised Sector

Gillnets & Hooks and lines

Motorised fishing units have been operating for the last two decades in Kerala. Most of the canoes and plank-built boats are fitted with outboard motors. The costs and earnings of motorised gill net units and hooks and lines units operating in the selected centres of Kollam region is presented in Table 6. The average annual fishing trips of motorised units comes about 214 for gillnets and 190 for Hooks and lines. The quarterly fishing trips for the gillnet units ranges from 30 (July - September) to 67 (January-March) as against 35 (July - September) to 65 (January - March) for Hooks and lines units. The total catch of a motorised gillnet unit works out at 1020 kg and 3782 kg during July - September and October - December respectively. The catch per unit per trip is found to range from 33 to 63 kg due to seasonal variations. With the annual gross earnings of Rs. 148884, the gross revenue realised per quarter ranges from Rs.18360 during July - September to Rs. 51975 during April - June. The average revenue per trip comes about Rs. 696 ranging from Rs. 495 during January-March to Rs. 945 during April to June. The average annual catch of motorised hooks and lines units works out at 390 kg ranging from 875 kg to 2275 between July - September and January - March periods. The average catch per trip comes about 28 kg with the gross earnings of Rs.911. During January to March, the hooks and lines units are getting the maximum earnings due to the higher catch rates as well as the increase in the number of fishing trips. The gross revenue realised per annum works out to Rs. 1.73 lakhs.

The average annual variable costs and earnings of motorised fishing units

Marine Fisheries Research and Management**Table 5. Average operational costs and earnings (Rs) of trawler (32'-36) at Neendakara (1995-96)**

Item	Annual	Per trip
I. Operational costs		
Bata to Crew	22500	100
Wages	135000	600
Fuel expenses	362250	1610
Repair and maintenance	28125	125
Auction commission	16200	72
Miscellaneous	19125	85
Total	583200	2592
II. Catch	52926	235
III. Revenue	807110	3587
IV. Net operating income(III - I)	223910	995

Table 6. Average catch (kg) and revenue (Rs) of motorised units operating at Kollam region (1995-96)

Items	April- June	July- Sept.	Oct.- Dec.	Jan. March	Annual
I. Gillnets					
Average fishing					
trips	55	30	62	67	214
Catch	3465	1020	3782	2211	10478
Revenue	51975	18360	45384	33165	148884

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Catch per trip	63	34	61	33	49
Revenue per trip	945	612	732	495	696

II. Hooks & Lines

Average fishing trips	50	35	40	65	190
Catch	1000	875	1240	2275	5390
Revenue	2530	24500	37200	86450	173150
Catch per trip	20	25	31	35	28
Revenue per trip	500	700	930	1330	911

Table 7. Average operational costs and earnings (Rs) of motorised fishing units in Kollam region (1995-96)

Item	Gillnets		Hooks & Lines	
	Annual	Per trip	Annual	per trip
I. Operational costs				
Wages	56710	265	76000	400
Fuel expense	34240	160	33250	175
Repair & maintenance	16050	75	11400	60
Auction commission	3210	15	4180	22
Miscellaneous	9630	45	10450	55
Total (I)	119840	560	135280	712
II. Catch (kg)	10478	49	5390	28
III. Revenue	148884	696	173150	911
IV. Net operating income (III-I)	29044	136	37870	199

operating gillnets and hooks and lines are given in Table 7. The annual operational costs of a motorised gillnet units comes about Rs. 1,19,840. Wages to labours (47%) and fuel expenses (29%) are the major components of the operational cost. The revenue realised per trip works out at Rs 696 and the operational cost at Rs. 560 giving the net income of Rs. 136. The annual net operating income of a motorised gillnet unit comes about Rs. 29,000. Although the catch per unit per operation of gillnets decreased over the years, the increase in price of almost all varieties of fish in recent years has enabled them to continue with their fishing operations.

The annual variable cost of motorised units with hooks and lines works out at Rs. 1.35 lakhs. The operating cost per trip works out at Rs. 712 with the net operating income of Rs. 199. The annual net operating income comes about Rs. 37870. The catch per unit per trip in Hooks and lines units is only 28 kg. But they could get higher earnings compared to gillnet units due to the quality fishes caught by these units.

Ring seiners

Most of the ring seine boats owned by the people of Kollam District are operated from Neendakara Fisheries Harbour due to the operational conveniences and better marketing facilities. However, most of the units are migrating towards north especially to Ambalapuzha, Valanjavazhi and other landing centres due to seasonal changes in the fishery. Hence, there are instances of complete absence of ring seine units operating from Neendakara in some months. The quarterly average catch and revenue of ring seine units operated from Neendakara Fisheries Harbour is given in Table 8.

The annual average fishing trips of ring seine works out at 170. A minimum of 30 and a maximum of 50 fishing trips are observed in different seasons. The tuna, mackerel, sardines, white-baits, carangids and prawns are caught by these units. The annual catch of a ring seine varies from 1950 kg during April - June to 7525 kg during January - March with the catch per trip of 65 to 175 kg. The gross earnings realised ranges from Rs 0.39 to Rs 2.25 lakhs due to seasonal variation. The average revenue realised per trip is minimum during April - June with Rs 1300 and maximum during January - March with Rs 5250.

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Table 8. Average catch (kg) and revenue (Rs) of ring seines operating at Neendakara Fisheries Harbour (1995-96)

	Apr.- Jun.	Jul.- Sep.	Oct.- Dec.	Jan.- Mar.	Annual
Average fishing trips	30	50	47	43	170
Total catch	1950	4250	5828	7525	19553
Total revenue	39000	106250	157356	225750	528356
Catch per trip	65	85	104	175	115
Revenue per trip	1300	2125	3348	5250	3108

The average operational costs and earnings of a ring seine unit is given in Table 9.

Table 9. Average operational costs and earnings (Rs) of a ring seiner at Neendakara (1995-96)

Item	Annual	Per trip
I. Operational costs		
Bata to crew	26350	155
Wages	207060	1218
Fuel expense	130390	767
Repair and maintenance	25500	150
Auction Commission	20400	120
Miscellaneous	15300	90
Total (I)	425000	2500
II. Catch (kg)	19553	115
III. Revenue	528356	3108
IV. Net operating income	103356	608
(III - I)		

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The annual operational cost of ring seine units works out at Rs 4.25 lakhs with the operational cost of Rs. 2500 per trip. Daily allowance to the crew and their wages constitute about 25% and fuel expenses comes about 31% of the operational cost.

The annual revenue realised works out at Rs. 5.28 lakhs from the annual catch of 19.5 tonnes. The average catch per trip works out at 115 kg with the revenue of Rs. 3100 per trip. The net operating income per trip and per annum works out at Rs. 608 and Rs. 1.03 lakhs respectively. The declining catch coupled with the lesser returns force the ring seine units to reduce the fishing trips or migrates to other centres. The ring seine operations are labour-intensive and the annual fishing trips are coming down year after year creating substantial unemployment among the fishing labourers.

Non-mechanised sector

Shore seines

In the earlier years shore seines locally known as "Kampa Vala" were widely operated in this region. At present only 20 shore seine units are being operated in this region and its decline in number is mainly due to the erection of seawalls coupled with the decrease in the catch rates. The old plank-built boats locally known as 'Kettu Vallam' are used for operation of shore seines. The average investment (present value) of a shore seine unit comes about Rs. 30,000 comprising Rs. 18,000 for the craft and Rs. 12,000 for the gear. The actual fishing operation ranges from 1 to 2 hours with the involvement of 30 - 40 persons. About 66% of the gross income is received by the owner of the unit and the rest is shared equally among the crew members.

The quarterly average catch and revenue of a shore seine unit operating at selected centres of Kollam region is given in Table 10. The average fishing operation is found to range from 40 during July - September and 60 during January- March with an annual fishing days of 199. The catch in these units are mainly constituted by white-baits, silverbellies, oilsardines, lesser sardines, thryssa, mackerel, croakers and carangids. The average annual catch in a shoreseine works out at 22.2 t ranging from 2.5 t to 9.5 t in different seasons. With an annual catch of 112 kg per trip, it is found to vary from 54 kg to 180 kg during different seasons, the gross earnings per annum works

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out at 2.65 lakhs and the revenue per operation comes to Rs. 1295. The average variable costs and earnings of shore seines is given in Table 11. The average variable costs works out at Rs. 1.8 lakhs in which wages alone constitute about 88%. The average annual earnings of a wage earner of a shore seine unit works out at Rs. 4520 with an average wage of Rs. 23 per operating day. Shore seine operations are sustainable because it is a part time work for many labourers. The net operating income works out at Rs. 77,000 per annum and Rs. 387 per operation. Fishermen reported that there is a steady decline in resources near the inshore areas in recent years and the catch per day of operation has been drastically reduced.

Though instances of nil catch has become a common affair in many of these operations, an yield of bumper catch once in a while sustains the shore seine fishery.

Gillnets

Due to the increasing phase of motorisation, the non-mechanised canoes operating gillnets in the indigenous sector has declined drastically during the last decade. The resource specific gillnets like rays-net, mackerel-net and sardine-net are mostly used by small canoes and catamarans depending upon the availability of resources in various seasons. The average initial investment of gillnet units comes about Rs. 35,000.

The quarterly average catch and revenue of a gillnet unit at selected centres of Kollam region are given in Table 10. The annual fishing days are about 201 with a minimum of 42 days to a maximum of 57 days in different seasons. The average revenue realised is Rs. 98,280 from the annual catch of 6 t with a catch of 31 kg and a revenue of Rs. 489 per trip. The catch composition include oilsardine, mackerel and rays. The average operational cost per annum and per trip are about Rs. 66,000 and Rs. 330 respectively in which labour alone constitutes about 79% (Table 11). The net operating income of a gillnet unit is about Rs. 31,950 per annum and Rs. 159 per trip. The indigenous gillnet units are sustaining mainly as a family enterprise.

Table 10. Average catch (kg) and revenue (Rs) of artisanal fishing units operating from Kollam region (1995-96)

	April - June	July- Sept.	Oct.- Dec	Jan.- March	Annual
I. Shore seiners					
Average fishing operation	46	40	53	60	199
Total catch	2484	5720	9540	4500	22244
Revenue	43740	68640	76320	69003	257703
Catch per operation	54	143	180	75	112
Revenue per operation	810	1716	1440	1150	1295
II. Gillnets					
Average fishing trips	42	50	52	57	201
Annual catch	420	1250	1300	3192	6162
Annual revenue	8420	22500	19500	47880	98280
Catch per trip	10	25	25	56	31
Revenue per trip	200	450	375	840	489

Table 11. Average operational costs and earnings (Rs) of artisanal fishing units in Kollam region (1995-96)

Item	Shore seiners		Gillnets	
	Annual	per operation	Annual	per trip
I. Operational costs				
Wages	158205	795	52260	260
Repair & Maintenance	7960	40	8040	40

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Auction Commission	5174	26	2010	10
Miscellaneous	9353	47	4020	20
Total (I)	180692	908	66330	330
II. Catch(kg)	22244	112	6162	31
III. Revenue	257703	1295	98280	489
IV. Net operating				
income (III-I)	77011	387	31950	159

Conclusion

This study indicates that the catch rates of almost all types of fishing units operating along Kerala Coast has declined drastically during the last decade. Although the intensity of operations of some of the traditional fishing techniques like shore seine and a few specific types of gillnets declined substantially in the inshore belt, there is a steady increase in the motorised and mechanised fishing units. The enhanced utilization of the inputs and the decline in the catch rates further led to the increase in the cost of production of marine fish. However, the general increase in the price of the fish and fishery products both in the national and international markets helped the survival of this vital sector in Kerala. The number of fishing units currently operating along the inshore belt of Kerala is more than its real requirement. However, they are surviving as they are running as labour intensive family enterprises. Hence, any additions in the fishing fleets should be advisable only to the deep sea sector of Kerala for the balanced and sustainable development of marine fisheries. Product diversification and market promotion are very essential to boost our marine products exports. A cautious marketing policy should be evolved for the parallel development of internal as well as the export marketing systems.

Deepsea fishing should be intensified by encouraging the fishermen to adopt Dory-type of fishing in which a series of indigenous boats are involved in fishing and transportation of catch, material and men, which will increase the marine fish production and enhanced availability of fish. Awareness campaigns should be conducted in our fishing villages on the importance of

mesh size regulation to avoid juvenile fishing for the overall benefit of the marine fisheries in the long run. The traditional fishermen operating in the inshore regions are caught in the low income trap due to the diminishing returns from capture fisheries. Open sea mariculture offers good scope for augmenting production and remunerative employment to our coastal fishermen. Integration of small-scale mariculture with small-scale capture fisheries is a viable alternative to supplement their income.

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