Socio Economic Scenario of Marine Fisheries in Kerala - Status and Scope for Improvement

R. Sathiadhas
Socio Economic Evaluation and Technology Transfer Division
Central Marine Fisheries Research Institute, Cochin-682018

Introduction

Marine fisheries play an important role in the coastal economy of Kerala. Fishery and coconuts are the major contributors for the food security of the coastal region. The inshore sea area falling within the territorial limit of the State (22km) is about 13,000 sq.kms. The continental shelf area of the sea adjoining the Kerala State is 39139 sq.kms. This part of the sea is considered as the most productive portion of the Arabian Sea. The pioneering attempts of the state in mechanisation and motorisation led to significant achievements in the fisheries sector. It is well known that maintaining sustainable production with equitable distribution of wealth is essential for balanced development and socio economic welfare of the stakeholders. Although technological advances have helped to enhance fish production, there are problems of decline in per capita production, disguised unemployment and growing sectoral inequity disturbing the congenial socio economic frame work of the coastal villages. The present paper attempts to analyse the gross income generated from fisheries and their distribution pattern, occupational pattern of stakeholders, mode of ownership of fishing equipments, per capita investment and earnings and other socio economic problems and prospects for improvement.

Fisheries Sector in Kerala – Socio Economic Aspects

The share of fishery sector in the Agricultural State Domestic Product of Kerala increased from 5.18 % in the eighties to 9.36 % in nineties and thereafter maintained a stable position. The consistent increase in share of fisheries in the agricultural and allied sectors over the years establishes the significance of this sunrise sector. The contribution of fisheries sector in the state has an annual compound growth rate of 13.32 % (during 1980-81 to 2004-05). Although absolute value of fisheries sector product is increasing over the years, its share in Net State Domestic Product is declining due to increased contribution of services sector after 2001-02.

In Kerala sea food industry is growing over the years and is dominated by exports of shrimps, cuttlefish, squids and finfish varieties. The export has been mainly directed to destinations

Table 1: Contribution of Fishery sector in the State Domestic Product of Kerala

Years	Net State Domestic Product (Rs. Crore)	% contribution of fishery sector to agricultural SDP	% of FDP to NSDP
1980-81	3822.73	5.18	2.03
1990-91	12173.5	9.36	3.06
2000-01	63715.1	9.74	2.14
2004-05	89452	9.23	1.54

Note: Figures from 1980 to 1990-91 are calculated on 1980-81 base and remaining figures are on 1993-94 base (current prices) (Source: www.rbi.org.in)

like European Union, U. S, Japan and China. The exports, in fact stimulated the growth of post harvest facilities and fast infrastructure development of fishery sector. The sector in the initial phase of development could absorb substantial investment and manpower due to its potential of significant export earnings and vast scope of domestic market expansion. The population depending on fisheries has steadily increased over the years. Currently (2005) there are about 6,02,234 people solely depending on fisheries for their livelihood.

The coast of Kerala extends to 590 Kms spreading over nine coastal districts, the maximum coastline being shared by Alleppey and Kannur (82 Kms)(Table 2). Trivandrum district has maximum fishing villages (42) and Kannur with minimum (11). Number of landing centres is found proportionate to fishing villages. Average fisher households per village in the state is 543 while the highest is in Trivandrum (813) and lowest is in Kasargod (299). Maximum fisher population was observed in Trivandrum (24%) followed by Alleppey (17 %) and Kozhikode (15%).

The number of households per village in All India basis is 236 with a maximum of 543 in Kerala and a minimum of 50 in Goa. The sex ratio is 980 in Kerala as against 948 in fishing villages at all India level. High density of population all along the coast with limited accessibility of land resources lead to over dependence on marine resources for their sustenance.

Table 2: District wise fisher families and population

Districts	Length of Coast line	Fishing villages	Landing centres	Number of fishermen families	Total fishermen population	Average fisher households/village
Trivandrum	78	42	50	34,128	143,436	813
Kollam	37	26	18	11,899	43,210	458
Alleppey	82	30	13	21,759	101,341	725
Ernakulam	46	21	13	8,876	42,069	423
Trichur	54	18	19	6,598	34,078	367
Malappuram	70	23	12	10,462	79,858	455
Kozhikode	71	35	25	16,058	87,690	459
Kannur	82	11	11	5,929	36,686	539
Kasargod	70	16	17	4,777	33,866	299
Total	590	222	178	120,486	602,234	543

Source: 1. Marine Fisheries Census of CMFRI, 2005

Table 3: Educational status of fisherfolk in Kerala (2005)

Districts	Educated				Literacy rate
	Primary	Secondary	Above secondary	Total	
Trivandrum	36,638	47,117	9,804	93,559	65
Kollam	11,667	16,832	6,025	34,524	80
Alleppey	35,741	37,506	11,261	84,508	83
Ernakulam	13,532	17,674	5,051	36,257	86
Trichur	9,645	14,032	2,888	26,565	78
Malappuram	19,101	21,508	1,643	42,252	53
Kozhikode	24,626	36,940	5,970	67,536	77
Kannur	9,911	15,703	3,691	29,305	80
Kasargod	10,609	11,392	2,160	24,161	71
Total	171,470	218,704	48,493	438,667	73

Source: Marine Fisheries Census of CMFRI, 2005

The literacy rate of fisherfolk in Kerala varies from 53% in Malappuram to 86 % in Ernakulam. The overall literacy of fisherfolk in the state is estimated to be 73 % as against 56.5 %for fisherfolk at All India level. Of the total educated 39% received primary education while 50% was educated till secondary level and 11 % got above secondary education.

There are 2,24,606 people employed in marine fishery sector of which 1,40,222 are in active fishing, 71,074 in secondary activities and 13,310 in tertiary sector. The overall dependency ratio is 1:3 which varies from 1:2 in Trivandrum district to 1:4 in Kannur district. The dependency ratio clearly indicates that most fisher people have to involve in one or other

Table 4: Occupational profile of coastal fisherfolk (2005)

Districts	Occupational status				Dependency ratio
	Active fishermen	Secondary sector	Tertiary sector	Total	
Trivandrum	38,805	25323	2,066	66,194	2
Kollam	8,665	6,515	1,166	16,346	3
Alleppey	25,255	10,740	3,158	39,153	3
Ernakulam	9,713	6,057	1,693	17,463	3
Trichur	7,054	2,668	288	10,010	3
Malappuram	16,422	5,583	1,153	23,158	3
Kozhikode	20,119	7,787	1,806	29,712	3
Kannur	6,470	2,100	1,070	9,640	4
Kasargod	7,719	4,301	910	12,930	3
Total	140,222	71,074	13,310	224,606	3

Source: Marine Fisheries Census of CMFRI, 2005

activity in the young age itself. This is primarily one of the reasons for drastic decline in educational level beyond secondary education. It may be further seen that the distinct coastal zone of Trivandrum has high dependency ratio where still non mechanised fishing is prominently prevalent and more family members have to work to eke out for a living.

Role of women in secondary sector

Women play an active role in secondary sector of marine fisheries. In Kerala, almost 50 % of the post harvest activities are undertaken by them. (Table 5). Majority of the total population working in secondary sector (25%) are engaged in marketing of fish followed by labourers in secondary activities (24%). While majority of their male counterparts are engaged in labour in secondary activities, women are mostly involved in marketing of fish (37%) followed by peeling workers (22%). Women involvement is highest in activities like marketing of fish (72 %), curing/processing (85%) and peeling (95%).

Table 5: Occupational structure of fisherfolk engaged in secondary sector (2005)

Activities	Number of fisherfolk		
	Male	Female	Total
Marketing	4964	13012	17976
Making/repairing of net	5500	4060	9560
Curing/processing	590	3291	3881
Peeling	416	7641	8057
Labourer	15705	1537	17242
Others	8447	5911	14358
Total	35622	35452	71074

Source: Marine fisheries Census of CMFRI, 2005

Table 6: District wise women employment in secondary sector

Districts	Marketing of fish	Making/ Repairing net	Curing/ Processing	Peeling	Labourer	Others	Total	Percentage to total
Trivandrum	8686	3395	1365	102	754	1816	16118	45
Kollam	986	525	302	169	89	2367	4438	13
Alleppey	256	9	387	4997	193	571	6413	18
Ernakulam	212	61	298	1710	77	246	2604	7
Trichur	87	4	384	410	17	138	1040	3
Malappuram	14	3	135	10	39	213	414	1
Kozhikode	39	23	365	241	252	350	1270	4
Kannur	273	1	54	0	47	71	446	1
Kasargod	2459	39	1	2	69	139	2709	8
Total	13012	4060	3291	7641	1537	5911	35452	100

Source: Marine Fisheries Census of CMFRI, 2005

Women employment in the state was highest in Trivandrum (45%) followed by Alleppey (18%) and Kollam (13%) (Table 6). In Kannur and Malappuram women involvement in secondary activities were hardly 1% of the total women in the state. Majority of women undertook marketing of fish as an avocation in Trivandrum, Kollam, Kannur and Kasargod. While in districts like Ernakulam, Alleppey and Trichur, most of them were involved in peeling.

Capital investment and Ownership of fishing units

There are many fishing crafts, which are older even up to 20 years, operating along the coasts of Kerala. The gross investment ranges from about Rs 10, 000 for a small non-mechanised catamaran unit to Rs.30 lakh for a trawler. The total investment in fishing units in the state is Rs. 1300 crores of which major portion is accounted by the mechanised segment (85 %) and rest by motorised and non mechanised segments (Table 7). This disparity is aggravated in the per capita investment per active fishermen in the state. The per capita investment per active fisherfolk in mechanised units is 3,22,092 reflecting the capital-intensive nature, whereas it is as low as Rs. 21,311 in motorised and Rs. 5,235 in non-mechanised segments.

Introduction and intensification of multi day fishing units led to the manifold increase in the capital investment of mechanised sector. The capital intensive technologies are definitely helping to enhance the per capita labour productivity, perhaps at the cost of reducing the overall labour requirement.

Production and Earnings

The gross marine fish landings in Kerala have shown an increasing trend during 1961 to 1975. The overall production has increased from 2.69 lakh tonnes in 1961 to 5.36 lakh tonnes in 2005 mainly due to technological advancements in fishing methods, increased utilisation of extended fishing area and increase in the number of fishing fleets. Though there is a decrease in total landings during 1980s (2.79 lakh tonnes) compared to its previous years landings (4.21 lakh tonnes in 1975), the gross landings showed a steep increase to the highest (6.63 lakh tonnes) in 1990. During 1995, though the landings decreased by 1.31 lakh tonnes, it has retained a higher landing rate compared to the level in 1960s and 1970s. Subsequently in 2000, the landings increased to the level of 6.04 lakh tonnes, almost similar position to nineties when all time high landings were observed. However, in 2005 there was a reduction of 0.68 lakh tonnes compared to 2000.

The significant change in the marine fish production along the coast for the last two decades was the increase in the landings of the cephalopods, which forms a major share of the Indian export earnings. Cuttle fish and squids formed the major items among the cephalopods. In 1961, only 28 t of cephalopods were landed which increased to 27277 t in 2003 with the highest value of 43,475 t recorded in 1995. The penaeid prawn catch in the State also substantially increased. The peak landings of penaeid prawns were observed during the second half of 1970s, which then declined to 26685t by 1985. Then onwards it maintained a somewhat steady trend by landing more than

Table 7 : Sector wise investment in fishing units and per capita investment (2005)

Capital investment	Total investment (Rs. Crore)	No of units	Active fishermen	Per capita investment/active fishermen (Rs)
Mechanised	1,105	5,504	34,307	3,22,092
Motorised	185	14,151	86,811	21,311
Non mechanised	10	9,552	19,104	5,235

Source: Marine Fisheries Census of CMFRI, 2005

Table 8: Marine fisheries production and gross earnings in Kerala

Year	Catch (tonnes)	Value (Rs. Crore)	
		First Sales	Last Sales
2000	604113	2438	4272
2001	514139	2169	3747
2002	589519	2303	3990
2003	623293	2497	4309
2004	616839	2386	3886
2005	536215	2167	3538

Source: CMFRI

30000t till 2005. The recent exploitation of deep-sea shrimps by the mechanised trawlers operating from Neendakara, Cochin and Munambam also contributed substantially to the penaeid prawn catches. Irregular trend was observed in the catch of the two important pelagic fishes, oil sardine and Indian mackerel. Certain less valuable fishes such as, threadfin breams, lizardfishes etc, which form the by-catches in the mechanised trawlers, recorded an increasing trend in their catch. The major reason for this increase was the increase in the effort of mechanised trawling for the targeted species such as cuttlefish and *penaeid* prawns.

Earnings from marine fisheries at landing centre level and value at last sales showed that there was marginal decline from 2000 to 2005 (Table 8). The compound growth rate showed that landing centre sales reduced by 1.94% during 2005 in comparison with the base year (2000) and in retail sales decline was 3.09 %. The decline in revenue can be due to the significant reduction in landings by Penaeid and Non Penaeid prawns inspite of continuous increase in price level of almost all varieties. However the landings of cephalopods have been consistent over the years. An all time high level of first sales and last sales were observed in 2003(Rs. 2497 crore and Rs. 4309 crore respectively). While there is increase in the number of people depending on fisheries for their livelihoods, the production declined and the gross revenue generated remains more or less stagnant indicating the need for opting alternative employment opportunities. This trend most severely affected fishing labourers with drastic reduction in their per capita earnings.

The significant difference in the first and last sales indicates the high involvement of intermediaries in between the producers and consumers. The high price spread or marketing margins are mostly benefiting the traders and majority of them are from non- fishermen communities. It indicates that there is enough scope for more fisherfolk to involve in fish trade and other micro enterprises in the post harvest sector.

Declining catch trends and marginalisation of non mechanised sector

The sector wise catch trends in Kerala showed significant variation over the decades. Following intensive motorisation and

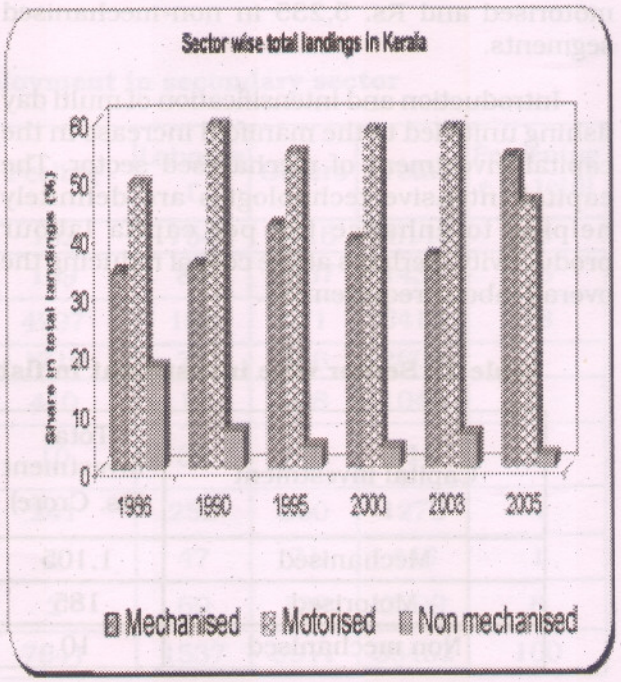

Fig. 1: Variation in sector wise landings over the

mechanisation of crafts in Kerala, the catch by those units increased and marginalised the non mechanised segment. Maximum fish landings were in the motorised sector till 2003 but the trend has reversed recently with mechanised segment contributing 53 percent of the landings (Fig.1). The non mechanised segment has been phased out of the scene with a share of a meagre 2 % of total marine fish landings. In addition technological improvements in capital intensive fishing implements have rendered the existing older units less economical or non operational, leading to substantial idling of fleets and underemployment.

Structural changes in the socio economic scenario of fisherfolk

The socio-economic yardsticks like education, employment, infrastructure development, recreation, means of ownership, per capita production, income and expenditure pattern etc has undergone rapid changes in recent years all along the Kerala coast. Educational status and employment pattern over the years clearly reveal a structural transition. The literacy rate amongst the coastal fisherfolk in Kerala was worked out to be 73 % in 2005. (Table 9).

Compared to eighties there was drastic reduction in illiterate persons from 77 % in 1980 to 27% in 2005. Educational level was less among those receiving education in primary (18%), secondary (4%) and above secondary (1%) in 1980's. The educational facilities currently available in proximity to the coastal fisherfolk include 458 primary schools, 202 secondary schools, 37 colleges and 54 technical institutions. In addition supportive infrastructure like 306 bank branches, 381 cooperative societies, 137 community centres and 83 cinema theatres are located along the coast line of the state. Similarly fishery related infrastructure in Kerala(Census of CMFRI, 2005) with 12 boat yards, 315 ice factories, 31 cold storages, 56 freezing plants, 414 curing yards, 153 peeling sheds and 4 fish meal plants provide opportunities for additional employment. As regards other basic amenities, all the villages are electrified and most of them are having road transport facilities. There are 357 hospitals located in fisher villages in Kerala Regarding housing, 75.37 % own tiled/concrete houses and rest are huts.

There is continuous structural changes in the craft gear combinations and fishing methodologies also depending upon the capital intensity, catch composition, demand and price of different varieties, profitability and per capita earnings of owners as well as fishing labourers. In the open access marine fisheries, mode of ownership of means of production by fisherfolk is the determining factor to know the socio-economic status. The ownership of means of production by active fishermen increased from 21% in the eighties to 28 % in nineties and then dropped to 21% (Table 10). In 1990, increase in ownership to 35 % was found because of intensive motorisation of crafts coupled with the existence of old non mechanised units which were replaced in the subsequent phase.

Table 9 : Change in educational status over the years (1980-2005)

Parameters	1980		2005	
	Number	Percentage of total	Number	Percentage of total
Illiterate	491218	77	163567	27
Primary	119823	18	171470	29
Secondary	23514	4	218704	36
Above secondary	5317	1	48493	8

Source: 1. Marine Fisheries Census of CMFRI,1980, 2005

Table 10: Ownership of means of production (1961-62 to 2005)

Particulars	1961-62	1973-77	1980	1990	2005
Number of fishing units	20667	22744	27254	41253	29177
Ownership by fisher households (%)	28	28	27	35	20

Source: 1. Marine Fisheries Census of CMFRI, 2005
2. Kerala Fisheries Facts and Figures, Department of Fisheries, Kerala,1990

There is a definite trend of decline in the number of non-mechanised boats in recent years. As non-mechanised fleets are decreasing, there is a clear increase in motorized and mechanized boats due to their better technical efficiency and comparative economic advantage. In mechanized sector itself, growth rate of trawlers is increasing at a faster rate, especially boats with 15 m and more OAL, which are capable for multi-day fishing. The per capita annual catch (kg) per unit of fishing over the years has indicated reducing fish stocks and over capitalisation in the fishing sector (Table 11). In all the sectors reduction in catch per unit was found. Compared to 1973-77, annual catch per unit in 2005 reduced from 138 tonnes to 52 tonnes (53%) in mechanised and reduced from 11,492 kg to 838 kg (93 %) in non

Table 11 : Sector wise per capita annual catch per unit over the years

Indicators	1973-77	1980**	1990	2005
Mechanised				
Number of units	1026	983	3742	5504
Production (tonnes)	116067	135305	231572	285890
Per capita annual catch per unit (Tonnes/unit)	113	138	62	52
Motorised				
Number of units	NA	NA	11374	14151
Production in tonnes	NA	NA	388624	242345
Per capita annual catch per unit(Tonnes/unit)	NA	NA	34	17
Non mechanised				
Number of units	21718	26271	26137	9522
Production in tonnes	249573	144238	42694	7980
Per capita annual catch per unit(Kg/unit)	11492	5490	1633	838

** denotes crafts owned by fisherfolk
Source: 1. Marine Fisheries Census of CMFRI, 2005
2. Kerala Fisheries Facts and Figures, Department of Fisheries, Kerala,1990

Table 12 : Sector wise per capita gross and net earnings

Indicators	Mechanised	Motorised	Non Mechanised
Gross earnings in first sales (Rs. Lakh)	115537	97939	3224
No of active fishermen	34,307	86,811	19,104
Per capita annual production per active fisherfolk (Kg)	8333	2792	419
Gross annual per capita earnings per active fisherfolk (Rs)	3,36,774	1,12,819	16,881
Net annual labour earnings per active fisherfolk	66,666	50,127	16,881

Source: CMFRI, 2005

mechanised units. Almost 50 % reduction in per capita annual catch per unit was seen in the catch of motorised and non mechanised segments from 1990 to 2005.

Similarly, the annual per capita catch (kg) per active fisherman in Kerala was 2128 kg in 1980 which increased to 3824 kg in 2005. This increase can be mainly due to enhanced multi day fishing units and increasing rate of motorisation. Out of the total active fishermen in Kerala, 34,307 are in mechanised sector, 86,111 are in motorised sector, 19,104 in non mechanised sector. Per capita catch per active fishermen in the mechanised units worked out to 8,333 kg , motorised units 2792 kg and non mechanised units 419 kg (Table 12). Gross per capita earning per active fisherfolk in Kerala worked out to Rs. 3,36,774 in mechanised Rs. 1,12,819 in motorised and Rs. 16,881 in non mechanised fishing units. However, the net annual labour earnings in mechanised sector was Rs 66,666 since the labour gets only 40 % of the net income after meeting operational expenses such as fuel and other costs.

In motorised sector, operational expenses account for only 33% of the total earnings and 2/3rd out of the remaining 67 % will be shared by labourers. Thus the net annual income per active fisherfolk in motorised sector worked out to be Rs. 50,127. The non mechanised sector works as a family enterprise and there is no difference between the annual gross and net earnings (Rs. 16,881).

Table 13 : Producers' share in consumers' rupee for selected varieties (2000-2005)

Varieties	PSFCR (%)		
	2000	2003	2005
Seerfish	81	68	71
Sharks	87	87	83
Lizard fish	59	50	57
Mackerel	71	73	71
Pomfrets	74	72	75
Penaeid prawns	55	58	59
Cephalopods	70	71	74
Rays	70	70	75
Skates	71	68	76
Oil sardine	44	44	50
Ribbon fish	54	57	60
Silverbellies	36	40	43
Croakers	50	51	58
Crab	65	67	75
Flat fishes	63	58	75

Source: SEETTD, CMFRI

Quality control in export marketing is highly emphasised in the WTO agreements of trade necessitating adequate care in all stages from catching of fish till the consumer point. The internal marketing and distribution system in the fishery sector of the country is not well equipped with quality maintenance mechanism comprising essential marketing infrastructure and proper administrative procedures. In the light of HACCP regulations, the government as well as industrialists has been increasingly complying with the quality standards of the export products. However, quality maintenance in the internal distribution system of fresh and processed fish is also essential. The development of internal marketing system adds to the nutritional and food security of common people. Fish is transported from the landing centres to far off retail outlets without proper storage facilities causing deterioration in quality. Transportation using insulated carriers and development of cold storages/cold chain networks provide solution to this problem. Hence quality assurance in the domestic marketing channel will enable the parallel development of the internal marketing system, which is highly essential to withstand any market collapse and price crash in the export market at any point of time (Sathiadhas *et.al.*, 2002).

Economic Implications of Monsoon Trawl ban in Kerala (2006)

Fishery policy in the first decade of planned development in Kerala can be attributed to judicious exploitation of marine resources by effectively and gradually raising the productive capabilities of existing facilities giving primacy to the accumulated skills of the fishermen (Kurien, 1988). In Kerala, the monsoon ban in this year (2006) was for a period of 62 days starting from 15th of June extending till 15th of August. The trawler operations are concentrated in major fishing harbours like Neendakara and Cochin. In addition, other types of mechanised crafts including gillnetters and purse-seiners were in operation. During ban period, all the operations were stopped in these harbours. The loss of revenue for withdrawing mechanised fishing in the monsoon seasons is calculated on average revenue obtained during rest of the year.

In total, for 3000 trawlers operating during the 45 day period of ban would have generated average gross revenue of Rs. 117.05 crore and during the extended period it would have been Rs. 52.76 crore. The total net income loss is estimated as Rs. 30.95 crore. For restricting operations of purse seiners, the loss in gross revenue was estimated as Rs. 68 lakh with a net income loss of Rs. 29 lakh. In case of gillnetters, the estimated gross revenue loss would be Rs. 1.77 crore for first 45 days with Rs. 78 lakh in extended period with Rs. 85 lakh loss in net income. In terms of gross revenue Rs. 30 crore would be lost for other units that would have gained net income of Rs. 10.76 crore

Economic loss in terms of generation of gross revenue by mechanised units if fishing operations were continued during the period from 15th June 2006 to 15th August 2006 was estimated as Rs. 203.49 crore. The corresponding net income loss was estimated as Rs. 42.85 crore. In total, 8.74 crore is estimated to be lost on account of loss of 9,63,996 man days in primary sector. In secondary sector the economic loss estimated due to loss of 2.6 lakh labour days was about Rs 1.71 crore. In tertiary sector, 119790 man-days was lost with an estimated economic loss of Rs 89.84 lakh. Thus the wage loss in primary, secondary and tertiary sector is estimated as Rs. 10.74 crore for 62 day of ban. The estimated loss for the fishery sector including loss of employment due to monsoon ban works out of Rs. 53.59 crore almost a net loss of Rs 1 crore per day.

Conclusion

Technological changes and their up scaling is a continuous phenomenon in the marine fisheries sector of Kerala stimulating far reaching impact on the socio-economic scenario of coastal communities. Acute competition to harvest maximum from the open access marine fisheries led to over capitalization, marginalization and increasing conflicts among the stake holders. The gross revenue generated from capture fisheries during 2005 at current prices is estimated as Rs. 2,167 crores at primary level and Rs.3537 at last sales. The employment generated in 222 coastal villages

and 178 landing centers comes about 1,40,222 in active fishing, 71,074 in secondary sector with additional vast opportunities in the marketing chain beyond the primary level . Fisher families depending on this sector for their livelihood security increased from 74,241 in 1961-62 to 1,20,486 in 2005 inhabiting in the coastal villages. The capital intensity is continuously increasing in the mechanized sector. Although the percapita capital investment for a fishing labour worked out to Rs. 92,710, it ranges from Rs. 5235 in the non mechanized sector to 3,22,092 in the mechanized sector. The per capita labour productivity per annum for 2005 works out to 419 kg for non mechanized units, 2792 kg for motorized units and 8333 kg for mechanized units enabling them to earn annual wages of Rs. 16,881, Rs. 50,127 and Rs.66.666 each respectively. Almost 25% of fisher families live in huts and the rest in *pucca* houses in tiled/ concrete roofs. The literacy level increased from 27% in1980 to 73% in 2005. Fisher households having some sort of ownership on crafts and gears declined from 28% in 1965 to 20% 2005. The ban on monsoon trawl fishing for 62 days in Kerala during 2006 has both positive and negative impacts. Barring the perceived advantages of stock enhancement and future economic benefits, the estimated immediate loss of employment in terms of man days due to trawl ban for 62 days during 2006 was 9.6 lakh man days in active fishing leading to the wage loss of abut Rs.8.74 crores, 2.6 lakh labour days in the secondary sector costing Rs.1.7 crore and 1 lakh labour days in the tertiary sector costing about Rs.0.9 crore. Altogether the estimated immediate net economic loss was Rs. 54 crores in spite of the loss in gross revenue of Rs. 203 crores in terms of production. There was steady decline in the catch rates but the increases in price level of all varieties of fish sustain the fishing operations. The supply chain in the domestic marketing system needs improvement which can offer innumerable employment opportunities. Retail outlets with modern facilities (clean water, storage, waste disposal etc) is the immediate necessity which can be constructed by local panchayats in each village and provided to fishermen on lease basis for ensuring supply of quality fish to local consumers. Supplementary occupations in the secondary sector and coastal aquaculture have good scope for expansion and provide additional employment opportunities. Disguised unemployment is rampant in active fishing stressing the need for promoting alterative avocation both within and outside the fishery sector.

Acknowledgements

I express my sincere gratitude to Prof. Dr Mohan Joseph Modayil, Director, CMFRI for the constant encouragement in preparation of this paper.

References

- Amarasiri Desilva, M.W 1977.Structural Change in a Coastal Fishing Community in Southern Sri Lanka. *Marga Quarterly Journal*, 4(2):67-68
- Clark, C., 1973, The economics of over-exploitation. *Science*, 181:630-634
- CMFRI, 1978, All India Marine Fisheries Census. Frame survey-1973-77, *Mar. Fish. Infor. Serv. T & E Ser.*, No. 3: 1978
- CMFRI, 1987, An appraisal of marine fisheries of Kerala, CMFRI Special Publication, Number 35.
- CMFRI, 2005, Marine Fisheries Census, 2005, Part I, Kerala
- Desai, M.B and P.R. Baichwal, 1960. Economic Survey of Fishing Industry in Thana District. Bombay, India. In E.F Szezepanic (Ed.) *The Economic Role of Middlemen and Cooperatives in Indo-pacific Fisheries*. FAO, Rome
- George, P.C 1974. Fisheries Planning and Development in India. *Proceedings of Indo-Pacific Fisheries Council*, 16th Session, Section 3, Bangkok
- Gordon, H.S., 1954, The Economic theory of Common Property Resource: The Fishery. *Journal of Political Economy*, 62:124-142
- Gurtner, P 1960. Development of Boat for India's Surf Coasts, In J.O.Traung (Ed.) *Fishing Boats of the World-2*. Fishing News (Books) Ltd., London

- Korakkandy Ramakrishnan, 1994. *Technological Change and the Development of Marine Fishing Industry in India – A Case Study of Kerala.* Daya Publishing House, Delhi – 110035, pp.1-338
- Krishna Srinath, 1987. Role of women in Small Scale Fisheries – A Case Study. *Mar. Fish. Infor. Serv. T&E.Ser.*, 72 : 12-17
- Lawson, R. M 1977. New Directions in Developing Small-Scale Fisheries. *Marine Policy*, 1(1) : 45-51
- Modayil Mohan Joseph (2004). In the Preface to On Designing Communication Tools for Responsible Fisheries. Ramchandran C. Responsible Fisheries Extension Series 7. Central Marine Fisheries Research Institute. Kochi-18
- Panikkar, K.K.P 1980. Coastal Rural Indebtedness – A Case Study. *Mar. Fish. Infor. Serv. T&E.Ser.,.*, 18 : 8 – 12
- Pietersz, S 1983. Possibilities for Improving the Quality of Life of Small-Scale Fishermen in the Bay of Bengal. *Geography Teacher*, 18 (2&3) 21-43
- Platteau, J. Ph. 1984. The Drive Towards Mechanisation of Small Scale Fisheries in Kerala: A Study of the Transformation of Traditional Villages Societies. *Development and Change*, 15, London
- Prakasam, M.S 1974. Impact of Mechanisation on Fishermen. *Voluntary Action*, 16 (2&3) March-June: 13-19
- Prasada Rao, D.L and R.Y. Kumar, 1984. Impact of Mechanisation on a Traditional Economy: A Case Study of Fishermen in Visakhapatnam. *Man and Life*, 10 (1&2) 31-42
- Ramchandran, C (2004) On Designing Communication Tools for Responsible Fisheries. Responsible Fisheries Extension Series 7. Central Marine Fisheries Research Institute. Kochi-18
- Rao Hanumantha C H (2004) State of the Indian Farmer: A Millennium Study. In Preface to the Millennium Study. Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. Academic Foundation, New Delhi.
- Sathiadhas, R and G. Venkitaraman, 1981. Impact of Mechanised Fishing on Socio-Economic Conditions of the Fishermen of Sakthikulangara – Neendakara, Kerala. *Mar. Fish. Infor. Serv. T&E.Ser.,.*, 29:1-18
- Sathiadhas, R and Panikkar, K.K.P, 1988. A Study on Marketing Structure and Price Behaviour of Marine Fish in Tamil Nadu. *Sea Food Export Journal*, 20 (12) : 5-29
- Sathiadhas, R, Reghu. R and Sheela Immanuel, 1997. Human Resource Utilisation, Productivity and Earnings in Indian Marine Fisheries. *Sea Food Export Journal.* Vol. xxx No.(4) : 51-55
- Sathiadhas, R. 1998. Socio-economic Structural changes in the marine fisheries sector of India and Coastal Zone Management. *Proceedings of seminar on coastal zone management*: 79-89
- Sathidhas, R 1998. Marine Fisheries in Indian Economy. In Balachandran, K. K et.al., (Ed.) *Advances and Priorities in Fisheries Technology.* Society of Fisheries Technologists (India), Cochin – 29. 463-72
- Selvaraj, C 1975. *Small Fishermen in Tamil Nadu.* Madras Institute of Development Studies, Publication No.9. Sangam Publishers, Madras
- Sen Amartya, 1973. Poverty, Inequality and Unemployment – Some Conceptual Issues in Measurement. *Economic and Political Weekly*, 16(14), 1950
- Shanbhu Dayal, 1981. Negative Effects of Mechanisation. *The Economic Times*, (Suppl.) 21 February.,10:8