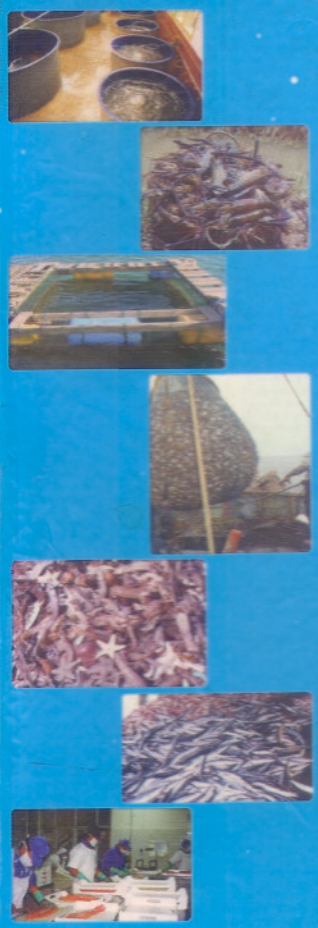
Sustain Fish



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Socio-economic scenario of marine fisheries in India - an overview

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Abstract

Indian fisheries contribute about 1.4 % of GDP, and constitute about 4.6 % of agricultural GDP. Currently the marine fisheries sector produces about 2.6 million tonnes (2003) of fish per annum forming about 50 % of the total production. Diverse types of craft-gear combinations are operated by about 12.2-lakh fisher folk with regional and seasonal variations all along the Indian coastline of 8129 km. The secondary sector provides employment to more than 15 lakh people and another one lakh people are employed in the tertiary sector. The sector provides livelihood security to about 18 - 20 million people. An overview of the marine fisheries sector with respect to the growth and economics of fishing units, sectoral capital investment and fishing intensity, capital-intensive technologies and disguised unemployment and price behaviour of fish reveals the need for an alternative approach in sustainable fisheries management, taking into consideration the dismal performance of the non-mechanised sector and the dependence of about one third of the active fishermen in the marine fisheries sector. The growth pattern in favour of mechanised and motorised sectors along with increased capital investments in these sectors have absorbed a major chunk of active fishermen, however resulting in a large-scale disguised unemployment within the sectors. Price of fish has registered a steady increase, from producers level to consumers level, indicating greater scope for employment opportunities in the secondary sector of fish marketing. The trend in fishermen's share in consumer's rupee at all India level for most of the varieties of fishes showed an increase which implies the increase in fish marketing efficiency. However, the very survival of fishing industry is dependent on export marketing leading to a rise in demand and prices, intensification of targeted fishing and adoption of the latest technologies, which has ultimately resulted in the marginalisation of non-mechanised fisher folk. Among different craft-gear combinations in fishing units, highest net operating income was contributed by purse seines with 15m OAL engaged in multi-day fishing in mechanised sector, canoes with ring seines in motorised sector and shore seines in non-mechanised sector.

Keywords: *Socio-economic scenario, Marine fisheries, Capital investment, Fishing intensity*

1. Introduction

The socio-economic scenario of fisherfolk living in 3,638 fishing villages all along the Indian coastline of 8129 km has witnessed rapid changes for the last few decades. Rising demand for fish coupled with

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ever increasing price level led to continuous advancements in catching technologies. Although the total production from open access marine fisheries increased, there is dwindling catch rates and diminishing returns for many craft-gear combinations, especially the traditional non-mechanised units. The decline in the per unit catch of all sectors and the tilted trend towards the mechanised sector in per unit earnings, has paved the way for more and more conflicts. Intra-sectoral conflicts in resource sharing, methods of fishing, area of operation, seasonal ban on certain fisheries, expansion of coastal zone aquaculture, inter-sectoral competition, problems in post-harvest sector and marketing, all worsen the socio-economic fabric of coastal villages. More involvement of fisherfolk in the marketing process and evolving alternative avocations for substantial number of fishers may alter their conditions. Conflict resolution through community participation is suggested in recent years for amicable sharing of resources through co-management.

Policies pertaining to harvesting and marketing strategies in marine fisheries, promotion of deep-sea fishing and mariculture development should also be considered for the sustainable development of traditional fisherfolk. The comprehensive and integrated development of the coastal zone as a whole, including development of aquaculture, mariculture and inshore marine fisheries with the involvement of more fishermen in post-harvest activities including value addition needs to be encouraged. The present paper attempts to highlight the socio-economic issues confronted by the fisherfolk and possible policy interventions to reduce the threat on their livelihood security.

2. Growth of fishing units

At present (2003 - 04) there are 2,251 traditional landing centres, 33 minor and 6 major fishing harbours in the marine fisheries sector of India. About 1.77 lakh of fishing crafts are in operation comprising 76,596 traditional non-mechanised fishing crafts, 50,922 motorized crafts and 49,070 mechanized crafts operating different gears as shown in Table 1.

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 are capable for multi-day fishing. Many of our existing mechanized boats have now started operating even beyond 100 m depth resorting to multi-day fishing and the current trend is to go for higher OAL fitted with engines of higher horsepower. The trends in

the growth rate of fishing units indicate the possible phasing out of non-mechanised canoes at least in certain regions. This downtrend is compensated in the motorised sector implying large-scale motorisation of existing traditional crafts. Mechanised crafts displayed a major boom during 1980s and 1990s. The growth rates were 135 and 147 % s respectively by 1980 and 1997, due to diversification and extended area of operation.

Table 1 – Growth rate of marine fishing fleets in India (1961-62 to 2003)

Year	SECTOR							
	Non-mechanised		Motorised		Mechanised		Total	
	No.	Growth Rate (%)	No.	Growth Rate (%)	No.	Growth Rate (%)	No.	Growth Rate (%)
1961-62	90,424	—	—	—	—	—	90,424	—
1973-77	106,480	18	—	—	8,086	—	114,566	27
1980	137,000	29	—	—	19,013	135	156,013	73
1997	160,000	17	32,000	—	47,000	147	239,000	53
2003	76,596	-52	50,922	59	49,070	4	176,588	-26

While mechanized trawlers and gillnetters are common all over the Indian coasts, Dolnetters are popular in Gujarat and Maharashtra coasts, Purseseines in Goa, Kanataka and Kerala coasts, pair trawling in Tamil Nadu and Sona boats in Orissa coasts, these depending on the regional and seasonal abundance of resources. When the technical efficiency of a particular gear is better than the other, automatically the less efficient gears are gradually replaced from operation.

3. Sectoral capital investment and fishing intensity

There are many fishing crafts, which are older up to 20 years, operating along the Indian coasts. The gross investment ranges from about Rs. 5,000 for a small non-mechanised catamaran unit to Rs. 35 lakh for a trawler in the small-scale fisheries sector. There is drastic structural change in fishing fleets and capital investment in mechanised, motorised and non-mechanised sectors of marine fisheries in 2003 (Table 2).

The fishing fleets as well as capital investment witnessed significant growth rates in mechanised and motorised sectors. The capital investment has increased more than proportionate to the increase in fleet size not only due to increase in price level and consequent increase in capital requirements but also diversification of fishing units opting for bigger OAL boats with high HP and other accessories. The gross capital investment on fishing units in Indian

marine fisheries sector during 2003 - 04 works out at Rs. 10, 532 crore in which mechanised sector constitutes about Rs. 9, 049 crore, showing more than three-fold increase over 1996 - 97. The increase in investment in mechanised trawlers and gill-netters are comparatively higher than that of other sectors. The capital investment in motorised sector also almost doubled from Rs. 456 crore during 1996 - 97 to Rs. 861 crore during 2003 - 04. However, as expected, the non-motorised sector has shown a decline in investment from Rs. 923 crore during 1996 - 97 to Rs. 622 crore during 2003 - 04 in tune with their decline in production and diminishing returns. Further, substantial numbers of these units were converted into motorised units.

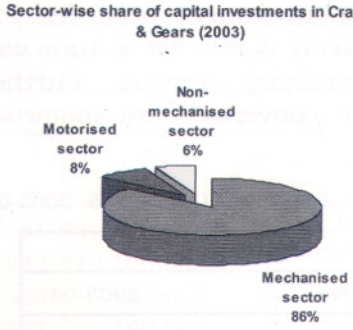
Table 2 - Estimated capital investment in Crafts and Gears (1996-97 & 2003-04)

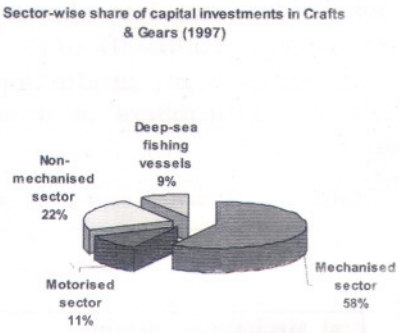
Category	Investment (Rs. Crore)	
	1996-97	2003-04
a) Mechanised sector		
Trawlers	1,879	**7,875**
Purse-seiners	134	181
Gillnetters	255	**724**
Dolnetters	49	**172**
Others	72	97
Sub total	**2,388**	**9,049**
b) Motorised sector		
Dugout canoes	31	196
Catamarans	48	86
Plank-built boats	188	428
Others	188	151
Sub total	**456**	**861**
b) Non-mechanised		
Dugout canoes	218	107
Catamarans	236	104
Plank Built Boats	4,192	401
Others	49	10
Sub total	**923**	**622**
Deep sea fishing vessels	**350**	**NA***
TOTAL	**4,117**	**10,532**

**NA-Not Available*

The estimated gross capital investment on fishing equipments alone works out to Rs. 4,117 crore at 1997 price level (Sathiadhas,

1998), in which 58 % is in the small scale mechanized sector, 9 % in deep-sea vessels, 11 % in motorized sector and 22 % in non-mechanized sector. It may be noted that out of the total capital investments on fishing equipments, during 2003, 86 % is constituted by mechanised sector, 8 % and 6 % respectively by motorised and non-mechanised sectors.





The overall per capita investments of an active fisherman in 2003 - 04 was Rs. 86, 290 ranging between Rs. 17, 024 in the non-mechanised sector and Rs. 2,19,319 in the mechanised sector. During 1997, the overall per capita investment was Rs. 40, 363, when the investment per head in mechanised sector was Rs. 125,689 and motorised and non-mechanised sectors invested Rs. 26, 835 and Rs. 13, 979 respectively (Table 3). Further, fishing intensity is directly related to capital investment *vis-à-vis* and the number and type of nets fishermen are possessing. A catamaran owner having different types of nets can have more number of fishing days. If he is having only one type of net, he will be having only lesser number of fishing days. In India, most of the non-mechanised fishermen are having only one or two fishing nets, which are not sufficient for efficient operation for the whole year.

Table 3. Per capita investment on fishing equipments for active fishermen in India - 1997 and 2003 (Rs.)

Sector	1997*	2003
Mechanised	125,689	219,319
Motorised	26,835	19,454
Non-mechanised	13,979	17,024
Overall	**40,363**	**86,290**

*Sathiadhas, (1998) (a) and (b)

In the open access marine fisheries, mode of ownership of means of production by fisherfolk greatly influences the occupational pattern and socio-economic status. The type and number of fishing implements owned is the yardstick to measure the economic well being of a fisher household. In India, hardly 13 % of the active fishermen in the marine fisheries sector have ownership of craft and gear in 2003 and another 3 % possess only gears. The proportion of owner operators in marine fisheries declined over the years with the increasing capital requirement for possessing motorized and mechanized fishing units. In the mechanised sector 12 %, motorised sector 9 % and traditional sector 21 % have ownership of crafts and gears. Most of the non-motorised units are operating as family enterprises not even realizing the operating cost of the labourers. Lack of finance and credit facilities does not allow these fishermen to go for modernization and come out of the vicious circle of poverty and low-income trap.

4. Capital intensive technologies and disguised unemployment

Every 100 kg of fish produced from marine fisheries provide full-time employment for 20 persons in the harvesting sector and to another 24 persons in post-harvest sector and one person in the tertiary sector. Earlier studies (Sathiadhas *et al.*, 1997) confirmed that altogether 10.2 lakh people are involved in active fishing and 12 lakh people are involved in pre and post-harvest sector of marine fisheries during 1995. During 2003 -04, 12.20 lakh people are employed in active fishing in the primary sector and another 15 lakh in the pre and post-harvest sector in the secondary sector and one lakh people in the tertiary sector. Thus it is estimated that about 18 to 20 million in India are depending on marine fisheries sector for their livelihood [This estimate is based on the following logic. The number of households with major occupation in marine fishing, fishery related activities and tertiary sector is about 2.82 million (*i.e.*, 1.22 million, 1.5 million and 0.1 million respectively). The figure is the product of total population in these segments and the average family size of 6.4 to 7 among the maritime states].

The proportion of catch by mechanised sector as a whole increased from 40 % during 1980 to 68 % in 1997 and again declined to 66 % in 2003. At the same time, the number of active fishermen depending on mechanised fisheries increased from 1.14 lakh to 2 lakh and again increased to 4.1 lakh respectively during the same period. It should be noted that the annual per capita production of active fisherman during the period has increased from 5, 260 g in 1980 to 8, 130 kg in 1997 and drastically declined to 4, 175 kg in 2003 (Table 4).

Table 4. Structural changes in socio-economic parameters in non-mechanised, motorised and mechanised sector (1980-2003)

Item	1980	1997	2003
Mechanised			
Marine fish production (%)	40	68	66
Average annual production (in tonnes)	32	33	35
Annual per capita production / active fishermen (in kg)	5,260	8,130	4,175
Ownership of means of production by active fishermen (%)	17	24	12
Active fishermen	114,000	200,000	412,596
Motorised			
Marine fish production (%)	—	19	27
Average annual production (in tonnes)	—	13	14
Annual per capita production / active fishermen (in kg)	—	2,390	1,592
Ownership of means of production by active fishermen (%)	—	19	12
Active fishermen	—	170,000	442,581
Non Mechanised			
Marine fish production (%)	60	13	7
Average annual production (in tonnes)	6.57	1.7	2.4
Annual per capita production / active fishermen (kg)	2,590	420	500
Ownership of means of production by active fishermen (%)	39	25	21
Active fishermen	348,000	650,000	365,360
Total			
Average annual production (in tonnes)	9.6	9.6	14.8
Annual per capita production / active fishermen (in kg)	3,247	2,254	2,138
Ownership of means of production by active fishermen (%)	34	23	14
Active fishermen	462,000	1,020,000	1,220,577

This clearly indicates the high prevalence of disguised unemployment in the mechanised fisheries sector.

The pressure for employment in active fishing is increasing more than proportionate to the harvestable yield in the open access marine fisheries. The fishermen involved in active fishing is more than the absorbing capacity of the fisheries sector and has led to lower per capita production, increased pressure on fishing which results in

juvenile fishing, high level discards and thus ultimately causing serious threats to resource sustainability and environmental stability.

Employment in fisheries sector has undergone rapid structural changes during the last few decades. Among those engaged in the mechanized sector, 75 % work in trawl fisheries and the rest 25 % in other sectors. In the case of motorized sector, 50 % are engaged in ring seine fishery alone. There is a wide disparity in income between those engaged in different sectors. It may be noted that still non-mechanized sector is providing about 30 % of the employment in active fishing, through harvesting hardly 7 % of the annual landings. Marginalisation of the indigenous non-motorised sector by the motorized and mechanized sectors frequently creates conflicts among fishers. The number of annual fishing days per worker reveals that the level of employment for hired labourers as well as those not having sufficient equipment is low and they are very much underemployed. The seasonal nature of fishery and the risk and uncertainties associated with marine fishing entangled the fishermen in the low-income trap. The alternate employment opportunities are very meagre .The poor economic condition coupled with the low availability of finance from the institutional agencies compel them to sustain with less equipped fishing implements which in turn results in diminishing returns. Several studies have highlighted the micro and macro level socio-economic conditions of fishermen in our country (Desai and Baichwal, 960; Gurtner, 1960; Sen, 1973; Prakasam, 1974; George, 1974; Selvaraj, 1975; Amarasiri Desilva, 1977; Lawson, 1977; Panikkar, 1980; Sathiadhas and Venkitaraman, 1981; Shanbhu Dayal, 1981; Pietersz, 1983; Platteau, 1984; Prasada Rao and Kumar, 1984; Subbarao, 1986; Krishna Srinath, 1987; Sathiadhas and Panikkar, 1988; Ramakrishnan, 1994)

The current scenario of marine fisheries in terms of fishing fleets clearly indicates a situation of "too many boats chasing too few fishes". Overcapitalisation in the mechanized sector and under employment in non-mechanised sector is rampant issues, which create regulatory, and conservatory problems for sustainable production on the one hand and socio-economic problems on the other. There are lots of variations among the fishing units in mechanized, motorized, and non-mechanised sectors. The continuous changes and up gradation of existing fishing technologies not only increase the efficiency of craft and gears but also marginalize the fisherfolk who are not able to cope up with the changes. The craft-gear combinations in the non-mechanised sector have undergone rapid changes. Many of the fishing technologies prominent in past years are now not visible in our coastal villages. Shore seine and low cost cotton nets have almost vanished. Bigger catamarans/canoes/plank-built boats with a variety of fishing gears

alone are now capable of withstanding the mounting competition from the motorized and mechanized sectors. The non-mechanised sector, as a whole, is sustaining only as a family enterprise. Similarly in motorized sector, technological upgradation in the form of bigger size of the net and boat has increased over the years. Boats fitted with 2 - 3 OB engines are very common, which enhanced their mobility and fishing capabilities. In the mechanized sector expanded fishing activities with extended fishing days of even more than five days per trip is very common. With this, acute competition, both inter and intra sectoral level has marginalized a number of fishermen who are depending on labour intensive technologies for their livelihood.

5. Income generated by marine fish at first and last sales

Growth and development of fisheries sector is totally dependent on the revenue generation potential. The gross values of fish at first and last sales were worked out on the basis of price data collected from selected landing centres and retail markets all over the country (Table 5).

Table 5 Economic evaluation of Indian marine fish landings at first and last sales (1999 &2003) (Rs. million)

NAME OF FISH	First sales (Producer level)		Last sales (Consumer level)	
	1999	2003	1999	2003
1. Crustaceans	47,335	57,689	91,029	102,954
2 Clupeids	9,705	16,216	19,410	32,629
3. Cephalopods	7,808	9,727	9,481	14,803
4. Seer fishes	4,080	7,231	4,836	9,639
5. Pomfrets	3,054	5,264	3,588	9,374
6. Croakers	4,157	4,367	9,036	8,056
7. Carangids	2,768	4,103	3,211	6,563
8. Mackerel	3,095	3,905	4,440	6,553
9. Perches	6,919	3,639	9,946	5,458
10. Ribbon fishes	4,560	2,611	5,836	4,887
11. Elasmobranchs	2,554	2,557	2,919	3,507
12. Bombayduck	1,073	2,307	2,244	3,436
13. Tunnies	1,188	1,294	1,808	2,107
14. Catfishes	1,050	1,244	1,620	2,039
15. Flat fishes	1,043	1,021	1,252	1,744
16. Threadfins	211	832	460	1,458
17. Barracudas	531	641	1,235	1,334
18. Silverbellies	593	597	732	971
19. Eels	395	412	721	791

20. Lizard fish	374	398	459	601
21. Goat fishes	203	227	375	380
22. Half and full beaks	161	170	198	245
23. Mullets	236	152	295	234
24. Flying fishes	40	140	74	225
25. Big-Jawed jumper	247	135	352	207
26. Bill fishes	57	102	125	181
27. Unicorn cod	2	0	6	0
28. Miscellaneous	1,420	3,210	2,923	6,154
TOTAL	**104,859**	**130,189**	**178,610**	**226,531**

The income generated at the landing centre level by marine fisheries was Rs. 10,486 crore during 1999 and 13,019 crore in 2003. It may be noted that crustaceans and cephalopods, meant for exports, alone contributed about 50 % of the gross earnings indicating over dependence on export marketing system for the sustenance of marine fishing operations. The value of marine fish at consumer level was Rs. 17,861 crore during 1999, which increased to Rs. 22,653 crore during 2003. The first sale and last sale price have increased by 70 % and 74 % in 1999 and 2003 respectively. This increase in price from producer level to consumer level indicates excellent scope for providing further employment opportunities for fisherfolk in the secondary sector of fish marketing. The influence of export price is clearly known from the gross value received from crustaceans and cephalopods.

Exports played a crucial role for the development of marine fisheries and socio-economic scenario of coastal rural sector. The infrastructure development in terms of ice plants, pre-processing centres, processing centres, export houses, consequent transport and other facilities along the fishing villages greatly owes to the growth of marine product exports. Most of the stakeholders in export marketing chain are women. Although export played a vital role for the development, the WTO regime on our exports should be closely watched and parallel development of domestic marketing system should be accorded paramount importance in our future strategies. The gross income generated at landing centre level was Rs. 13,019 crore as against Rs. 22,653 crore at consumer level including the marketing costs. It may be seen that Rs. 9,634 crore of rupees was shared among 15 lakh people involved in post-harvest sector.

The increase in fish prices at the international level and subsequent increase in domestic prices for almost all varieties of fish are higher than for food grains or other livestock products. Increase in this price level led to the intensification of targeted fishing, adopting the latest technologies. Frequent change in technologies resulted in the marginalisation of less equipped and non-mechanised fisher folk.

6. Price behaviour and fishermen's share in consumer's rupee

The post-harvest operations of fish provide more employment to labour than the production sector. The increase in wholesale and retail price of fish for the last three decades is far higher than that for any other food items. The average wholesale and retail price of selected varieties of marine fish at all India level is given in Tables 6 and 7.

Table 6. Wholesale price behaviour of selected varieties of marine fish in India (1973-74 to 2003)

(Value in Rs kg^{-1})

Name of fish	1973-74	1984-85	1989-90	1993-94	2003
1. Sharks	1.50	11.25	13.85	26.00	68.00
2. Rays	1.00	6.00	6.40	12.00	19.00
3. Catfishes	1.00	7.75	13.00	20.00	23.00
4. Oil sardine	1.00	4.00	6.90	13.00	21.00
5. Ribbon fishes	2.00	5.00	6.15	10.00	18.00
6. Pomfrets	2.00	17.50	15.20	35.00	134.00
7. Mackerel	2.00	6.25	9.00	23.00	34.00
8. Seer fishes	4.00	19.00	28.90	58.00	146.00
9. Tunnies	2.00	10.00	13.45	30.00	25.00
10.Whitebaits	2.00	5.00	5.85	15.00	20.00
11. Barracudas	2.00	11.25	15.20	30.00	43.00

Source: SEETTD, CMFRI

Table 7. Retail price behaviour of selected varieties of marine fish in India (1973-74 to 2003)

(Value in Rs kg^{-1})

Name of fish	1973-74	1984-85	1989-90	1993-94	2003
1. Sharks	2.50	17.00	17.00	31.00	88.00
2. Rays	2.00	10.00	10.75	15.00	31.00
3. Catfishes	2.50	11.00	16.50	30.00	40.00
4. Oil sardine	2.00	6.70	10.00	16.00	48.00
5. Ribbon fishes	2.50	8.50	10.00	19.00	33.00
6. Pomfrets	2.50	22.80	29.50	40.00	205.00
7. Mackerel	3.00	9.85	12.50	25.00	48.00
8. Seer fishes	9.00	27.00	35.50	66.00	195.00
9. Tunnies	3.00	16.50	18.50	39.00	39.00
10.White Baits	3.00	8.00	9.00	18.00	30.00
11. Barracudas	2.50	15.35	21.00	35.00	65.00

Source: SEETTD, CMFRI

The wholesale price of high quality fishes like sharks, pomfrets and seer fish increased from an average price of Rs. 3 in 1973 – 74 to Rs. 116 in 2003. The wholesale price of low quality fishes like rays and oil sardine, which fetched hardly one rupee in 1973 - 74 has witnessed a steady increase recording Rs. 19 and Rs. 21 respectively in 2003. A proportionate increasing trend is visible in the retail price behaviour also. On an average, the retail price of high quality fishes (sharks, pomfrets and seer fish) was 40 % higher than the wholesale prices in 2003, where as, the average retail price of low quality fishes like rays and oil sardine recorded an increase of 100 % over the wholesale price during the same period.

Fishermen's share in consumer's rupee is the best index to measure the efficiency of fish marketing system. Judging from the trend of fishermen's share in consumers' rupee at all India level during 1989 - 90, 1996 - 97 and 2003, the fish marketing efficiency has increased over the years (Table 8) for most of the varieties. During 2003, fishermen's share in consumers' rupee ranged from 45 % for silver bellies to 75 % for seer fish. Although the share of producers increased over the years for quality fishes like seer fish and pomfrets, there is enormous scope to enhance the marketing efficiency of low quality fishes such as silver bellies and lizard fishes in the internal markets.

Table 8 Percentage share of fishermen in consumers' rupee for different varieties of fish (1989-90 to 2003)

Name of Fish	1989-90 (%)	1996-97 (%)	2003 (%)
Seer Fishes	63	68	75
Pomfrets	62	60	65
Mackerel	54	50	72
Ribbon fishes	41	48	53
Tunnies	55	45	63
Catfishes	49	56	59
Barracudas	53	40	66
Silverbellies	41	30	45
Lizard fishes	42	35	56
Goat fishes	37	57	59
Rays	39	47	58
Whitebait	41	40	61
Threadfins	46	42	57

Source: SEETTD, CMFRI

7. Economics of fishing units – An overview

Estimated costs and earnings of different craft-gear combinations are given in Table 9.

Table 9 - Estimated costs and earnings of different craft gear combinations per trip (2003)

Type of craft-gear combination	OAL (m)	Gross earnings (Rs)	Operating costs (Rs)	Net operating income (Rs)
Mechanised				
Trawler				
Single day units	12	2,474	1,937	537
Multi-day units (2-5 days)	14	23,351	17,648	5,703
Multi-day units (6 & above)	15	44,575	27,934	16,641
Gillnetters				
Single day units	10	2,564	1,072	1,492
Multi-day units (2-5 days)	13	21,054	14,716	6,338
Multi-day units (6 & above)	14	61,870	40,150	21,720
Purseseiners				
Single day	10	34,682	13,548	21,134
Multi-day units (2-5 days)	15	115,025	72,643	42,382
Dolnetter (Single Day)	13	2,586	1,231	1,355
Motorised				
Plankbuilt boats with gillnet	8	1,950	1,470	480
Canoes with gillnets	9	6,590	5,500	1,090
Fibre-glass boats with gillnet	10	1,490	940	550
Catamarans with gillnet	10	3,530	3,000	530
Canoes with ring seines	8	24,000	20,000	4,000
Canoes with minitrawl	7	1,720	1,100	620
Fibre-glass boats with hooks & lines	8	2,380	1,160	1,220
Dinghi / bag net units	10	2,450	1,500	950
Non-Mechanised				
Catamarans with gillnet	4	735	525	210
Fibre-glass boats with gillnet	9	900	575	325
Dugout canoes / shoreseines	8	7,500	6,250	1,250
Catamarans with hooks & lines	4	570	420	150

Among the mechanised category, purse seines with 15 m OAL engaged in multi-day fishing (2-5 days) had the highest net operating income per trip (Rs. 42,382), gross earnings (Rs. 115,025) and operating costs (Rs. 72,643). Similarly, the trawlers with single-day operation had the lowest net operating income (Rs. 537) within

mechanised sector. Within the motorised sector, canoes with ring seines had the highest and plank-built boats with gill net had the lowest net operating income per trip. Catamarans with hooks and lines that operate with minimum costs (Rs. 420) had a lower net income (Rs. 120) in the non-mechanised sector. Dugout canoes/shore seines had the highest income (Rs. 1,250) among non-motorised category.

The per capita earnings of fishing labourer in a year are given in Table 10.

Table 10 - Per capita earnings of fishing labourer (2003-04)

Type of craft-gearCombination	Earnings per trip (Rs)	No of trips	Annual per capita Earnings (Rs)
Mechanised			
Trawler			
Single day	120	240	28,800
Multi-day units (2-5 days)	280	60	16,800
Multi-day units (6 & above)	650	36	23,400
Gillnetters			
Single day	300	240	72,000
Multi-day units (2-5 days)	350	60	21,000
Multi-day units (6 & above)	1,680	36	60,480
Purseseiners			
Single day	500	240	120,000
Multi-day units (2-5 days)	2,120	60	127,200
Dolnetter / Dol net (Single day)	90	240	21,600
Motorised			
Plankbuilt boats / gillnet	194	230	44,620
Canoes / gillnets	200	220	44,000
Fibreboats / gillnet	100	240	24,000
Catamarans / gillnet	150	200	30,000
Countrycrafts /ring seines	100	200	20,000
Countrycrafts / minitrawl	75	180	13,500
Fibreboats / hooks & lines	100	240	24,000
Dinghi/bag net	60	220	13,200
Non- Mechanised			
Catamarans with gillnet	200	200	40,000
Fibre boats with gillnet	60	210	12,600
Dugout canoes / Shore seines	100	180	18,000
Canoes with gillnets	120	240	28,800
Catamarans with Hooks &Lines	80	240	19,200

The annual per capita earnings was the highest for purse seines (Rs. 127,200) engaged in multi-day fishing (2 - 5 days) and lowest was recorded for trawlers of same category (Rs. 16,800). Though the per day earnings per trip was the lowest for single-day operating trawlers (Rs. 120), their annual earnings were higher than multi-day trawler units since they could operate 240 trips in a year. Among the motorised fishing units, plank built boats/gillnets had the highest annual per capita earnings (Rs. 44,620) and the lowest was recorded for dinghi/bag net units (Rs. 13,200). Catamarans with gillnet fetched Rs. 40,000 as gross per capita earnings in the year and fibre-boats with gillnet provided an earning of Rs. 12,600 per fishing labourer

8. Conclusion

The study of macro socio-economic indicators of marine fisheries sector in India reveals the realities that challenge sustainable development. There is increasing and authentic evidences, regarding the inter-dependence of economic well being and optimum exploitation of open access natural resources. The development trend is obviously posing problems within the marine fisheries sector due to ever-increasing adoption of capital-intensive technologies. Structural changes in the form of decline in the labour intensive traditional fisheries sector and increasing pace of conversion in motorisation have been taking place by the dawn of the twenty first century. The mechanisation process has contributed significantly to the production pattern by way of increased share in the fish production, from 40 % in 1980 to 66 % in 2003. On the other side, the marine fish production by the traditional sector has declined from 60 % to 7 %. Estimates of capital investments in crafts and gears also reveal the mounting importance of mechanised units, which increased from Rs. 2,388 crore in 1996 - 97 to Rs. 9,049 crore in 2003 - 04.

The unemployed labourer in the traditional non-mechanised sector has largely migrated to the capital intensive mechanised sector thus gradually resulting in a significant increase in the level of disguised unemployment. Though, still 1/3rd of the total labour force of active fishermen are employed in traditional sector, they are harvesting hardly 7 % of the total landings. The ever increasing mechanised boats and the increasing conversion of non-mechanised into motorised units with declining trend of artisanal (non-mechanised) units not only challenges sustainability of various harvesting strategies but also creates equity problems in the socio economic scenario.

The increased tempo of mechanisation led to the marginalisation of the traditional fishermen, which force them to go for motorisation to get a fair share of the common property marine resources. The

fishermen in traditional sector are invariably caught under low-income trap where they are unable to make the required investment on competitive fishing equipments. The introduction and growth of ring seines and mini trawls are the glaring examples for their survival strategy. The labour intensive fishing units are running on losses and sustaining only as family enterprises. It is quite advisable to extend subsidies and grants only for these groups of fishermen. As far as possible, gradual phasing out of the non-mechanised sector should be attempted which will enable these fisherfolk to reduce their drudgery and to bring them into the mainstream of socio-economic development of the country.

Improvement in the private capital investment on fishing equipments not only enhanced acute competition between different sectors but also in per capita investment of the fishing labourers in spite of declining per capita production. Currently, the average per capita investment comes to about Rs. 2.19 lakh for fishing labour in the mechanised sector as against Rs. 19,000 in the motorised sector and Rs. 17,000 in the non-mechanised sector. Further, there is an inverse relationship between active fishermen and ownership of crafts and gears in mechanised and motorised sectors indicating higher proportion of fishing labourers depending for their livelihood in these sectors over the years (1980 - 2003). In the non-mechanised sector also the percentage of active fishermen owning crafts and gears declined steadily from 39 % in 1980 to 21 % in 2003, having far reaching implications in the socio-economic scenario of coastal fisheries.

The annual per capita earnings of a fishing labourer ranges from Rs. 12,600 for a non-mechanised gillnet unit to Rs. 127,200 in a multi-day purse seine unit. It is quite interesting to note that the per capita investment of motorised sector declined from Rs. 26,835 in 1997 to Rs. 19,454 in 2003, indicating the growing trend of cooperative fishing in the place of competitive fishing in motorised sector, stressing the need for government support which may ultimately need the promotion of a regulatory management regime in the marine fisheries sector.

The excess capacity of fishing fleets, over capitalisation and rampant disguised unemployment in the inshore marine fisheries sector warrants withdrawal or diversion of substantial labour force into value addition segment of marketing to enhance their marginal productivity. The price behaviour of marine fish over the years and the increasing sales value indicates enormous potential for employment opportunities in the post-harvest sector. Although the marketing efficiency of fish and fish products has enhanced over the years, still 25 % to 55 % of the consumers' rupee is shared by intermediaries in the marketing channel. Hence, adequate support from government

and credit institutions may be extended to cooperatives or self-help groups of fisherfolk for initiating self-sustaining enterprises.

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