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Structural Change in the Traditional Fishery of Kerala and its Socio Economic implications

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Abstract : Motorization of traditional fishing craft has paved the way for a structural change in the artisanal fishery of Kerala. During the mid eighties the traditional sector started operating mini purse seines (Ring seine) and mini trawl nets and consequently the traditional gears in vogue for decades have been either disappeared or thoroughly modified. These two gears together contributed to more than 80% of the traditional landings. Hence the traditional fishing scenario has been completely changed which resulted in far reaching developments in the artisanal fishery sector. With the introduction of motorization the traditional fishery has been transformed from the subsistence to a level of cash crop operation. After motorization artisanal fishing units have become more profitable and the fishermen have become more conscious about the fishing surplus and in a position to repay the debts without much difficulty. The economics of different types of motorized fishing units have been presented in the paper. Other socio economic implications have also been discussed in the paper.

Introduction

The contribution of traditional sector to the fish landings of the state was about 70% until the mid seventies. With the increased tempo of mechanization in the late seventies, the artisanal sector suffered a set back with dwindled catches and problem of unemployment. The situation was all the more aggravated due to the introduction of purse seining in 1978-79 together with the failure of oil sardine fishery. This development was coincided with the programme of motorization of country craft that has helped the traditional fishermen to compete with the mechanized sector. With the result, by mid-eighties they started operating mini purse seines (Ring seines) and mini trawl nets with craft fitted with out board engines. These gears, till then were operated only by mechanized sector (boats with in board engines). Hence with the advent of motorization by mid-eighties the traditional fishing scenario has been completely changed which re-

sulted in far reaching consequences in the traditional sector. In the present paper an attempt is made to study the socio-economic implications of these changes.

Materials and Methods

Data pertaining to catch and effort have been obtained from C.M.F.R. Institute data centre. To estimate the economic parameters of different types of fishing units special surveys have been conducted during 1992-93 for collecting cost and earning data on all alternate days covering all the months from June 92 to May 1993 from selected sample units of different craft gear combinations at major fishing centres. Information on socio-economic condition of fisherfolk were obtained through the socio-economic surveys conducted by C.M.F.R. Institute at various fishing villages during the last two decades.

Information thus obtained was critically analyzed and the results are discussed below.

Results and Discussion

Fishing methods and production trend

Till the earlier eighties Kerala marine fishery was dominated by traditional fishing methods. The traditional sector, before the introduction of motorization, used the gears, boat seine (an encircling net known as thanguvala in central Kerala and kollivala in northern Kerala), drift/set gill net and hook & line. These nets were operated by plank built boat, dugout canoes and catamarans. During early eighties some of these traditional craft were fitted with outboard engines and these are known as motorised craft.

The process of motorization is different from mechanization. Usually mechanization is a labour saving device which is good if labour thus released can be gainfully employed in other sectors. However in our country where problem of unemployment is so acute any ambitious mechanization programme will be met with stiff resistance by the working class. Our traditional sector which vehemently opposed the onslaught of mechanization, readily accepted the motorization technology because it does not supplant the labour but only supplement it. Its investment requirement is also within their financial limitations.

Initially the craft fitted with OBM were operating only traditional gears. However, subsequently they started experimenting with the gears so far used by only mechanized boats. With the result by mid-eighties they initiated the operation of mini purse seine (ring seine) and mini trawl nets. Consequently, the traditional gears in vogue for decades have been abandoned. Hence with the advent of motorization, by mid eighties the tradi-

tional fishery has undergone a structural change. The most popular traditional boat seine operated with OB has almost been disappeared and replaced by ring seine. Upto 1984, boat seine was the only gear operated with OBM and about 1/3 of the entire landings was contributed by this gear. But in 1994 it reduced to 2.4% whereas OB Ring seine contributed 27% to the total catch and 70% of the catch of motorized units. OBBS catch of 1.8 lakh tonnes in 1985 reduced to 14 thousand tonnes in 1994 whereas OBRS landings during same period increased from 22.5 thousand tonnes to 1.5 lakh tonnes. The increase in the landings of traditional sector from 2 lakh tonnes in 1985 to 4.3

Table 1. Marine fish landings (lakh tonnes) in Kerala

Year	landings
1973	4.48
1974	4.20
1975	4.21
1976	3.31
1977	3.45
1978	3.73
1979	3.31
1980	2.80
1981	2.74
1982	3.25
1983	3.85
1984	3.93
1985	3.26
1986	3.38
1987	3.03
1988	4.70
1989	6.48
1990	6.93
1991	5.64
1992	5.61
1993	5.75
1994	5.68

lakh in 1989 was mainly contributed by OBRS. However, by 1994 it reduced to 2.4 lakh tonnes mainly due to the continuous failure of oil sardine fishery from 1989 to 1994. The oil sardine catch of 1.8 lakh tonnes in 1989 continuously declined and in 1994 it was only a meager 1400 tonnes.

As seen from the Table 1. the total fish landings of the state showed a declining trend from 1973 onwards touching the lowest of 2.8 lakh tonnes in 1980 and thereafter it increased with marginal

fluctuations and by 1988 it reached the highest level of 4.7 lakh tonnes which is only slightly higher than that of 1973 production of 4.5 lakh tonnes. This indicates that the increased tempo of mechanization during this period and the introduction of motorization in 1981 could not make any considerable impact to improve the total fish landings of the state. The increase in total landings was recorded with the introduction of Ring seine. (Table 2 & 3)

Ring seine is comparatively of larger

Table 2. Catch (in '000 tonnes) and Effort ('000 unit days of operation) of different gears along Kerala coast

Year Gear	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
MTN	97.0	115.5	143.9	196.2	199.2	222.0	212.7	248.4	299.3	317.9
	370	402	586	863	595	532	553	542	605	725
OTH	23.9	14.2	7.3	10.1	14.6	9.7	7.0	8.5	9.3	8.0
MEC	87	73	50	75	39	33	19	15	15	14
ORBN	-	22.5	31.6	81.9	270.9	257.9	226.3	196.4	159.8	154.6
		29	80	129	323	250	278	251	274	220
OBSN	23.3	34.3	21.1	31.2	58.4	55.5	36.6	28.1	36.8	35.1
	349	467	318	4850	600	560	453	468	542	562
OBTN	-	-	1.5	6.5	3.1	13.3	3.0	7.5	8.7	9.2
			18	31	37	81	67	100	130	144
OBDI-S	-	-	-	-	-	0.9	6.6	11.2	1.1	1.9
						31	68	92	47	56
OBHL	7.5	9.7	7.1	16.8	16.4	18.9	7.7	11.7	11.3	6.9
	139	105	111	219	223	158	109	118	152	130
OBBS	92.0	118.4	48.4	87.8	51.5	42.2	25.0	18.9	13.1	13.7
	203	329	170	196	96	68	53	36	19	51
NMG	22.1	16.3	12.7	13.1	12.9	15.6	15.4	12.0	12.1	8.4
N	737	691	714	602	659	615	745	642	520	452
NMBS	39.7	35.7		1.9	5.5	9.3	2.8	4.6	7.3	1.1
	197	179		27	50	74	46	52	53	15
NMSS	8.5	9.4	10.4	11.2	10.8	13.7	15.9	8.1	9.3	9.2
	101	89	126	87	113	78	86	77	60	52
NMHL	6.4	4.6	3.4	5.4	4.3	1.8	4.9	5.2	4.6	2.5
	764	330	287	458	429	179	379	325	328	272

size having an average length of 300 m and breadth of 65 meters. Initially because of its catching efficiency, its profitability was higher as compared to any

other gear used by traditional sector and consequently the size of the craft has been gradually increased to accommodate more workers to operate larger net and

Table 3. Gear wise marine fish landings (in tonnes)

GEAR Year	TN	OTR MECH	OBBS	OBN	OBR	OTHER O.B.	TOTAL O.B.	NM	GRAND Total
1980	106061 (38.01)	28722 (10.29)	-	-	-	-	-	144238 (51.70)	279021
1981	49313 (18.00)	23743 (8.66)	22848 (8.34)	-	-	-	22848 (8.34)	178074 (65.00)	273978
1982	62321 (19.15)	22869 (7.03)	63050 (19.38)	-	-	-	63050 (19.38)	177127 (54.44)	325367
1983	67908 (17.63)	30162 (7.83)	99082 (25.72)	-	-	-	99082 (25.72)	188128 (48.82)	385280
1984	93835 (23.88)	35806 (9.11)	133313 (33.93)	-	-	-	133313 (33.93)	139939 (33.08)	392893
1985	97037 (29.81)	23905 (7.34)	92002 (28.26)	23345 (7.17)	-	12122 (3.72)	127469 (39.15)	77125 (23.70)	325536
1986	115507 (30.17)	14278 (3.73)	118433 (30.94)	34263 (8.95)	22498 (5.88)	110 (2.90)	186282 (48.67)	66724 (17.43)	382791
1987	143913 (47.45)	7723 (2.54)	48416 (15.96)	21074 (6.94)	3155 (10.4)	10678 (3.52)	111726 (36.83)	39924 (13.16)	303286
1988	196020 (41.81)	9896 (2.11)	87800 (18.73)	31166 (6.65)	81886 (17.47)	29548 (6.30)	230400 (49.14)	32492 (6.93)	468808
1989	199217 (30.76)	14512 (2.24)	51477 (7.94)	58397 (9.01)	270903 (41.83)	19454 (3.00)	400231 (61.80)	33566 (5.18)	647526
1990	221955 (33.48)	9617 (1.45)	42162 (6.36)	55541 (8.38)	257853 (38.90)	33068 (4.99)	388624 (58.63)	42694 (6.44)	662890
1991	212736 (37.71)	6945 (1.23)	24973 (4.43)	36558 (6.48)	226330 (40.12)	17335 (3.07)	305196 (54.10)	39284 (6.96)	564161
1992	248356 (44.29)	8482 (1.51)	18898 (3.37)	28095 (5.01)	196416 (35.03)	30396 (5.42)	273805 (48.83)	30099 (5.37)	560742
1993	299301 (52.08)	9335 (1.62)	13075 (2.27)	36755 (6.40)	159772 (27.80)	21281 (3.70)	230884 (40.17)	35220 (6.13)	574739
1994	317285 (55.80)	7997 (1.40)	13733 (2.40)	35026 (6.10)	154619 (27.20)	17917 (3.50)	221295 (39.00)	21457 (3.80)	568034

Figures in the brackets are percentages to total catch.

engine with higher HP has been fitted. At present most of the ring seine units use two engines. As a result cost of operation has increased (operating and fixed costs). Due to the continuous decline in Oil sardine catch from 1989, they found it uneconomic to operate the bigger nets with two engines because of the higher operating costs. That is how the mini trawl operation has been initiated by the traditional fishermen. It has got the advantage of lower investment requirement i.e., usually less than Rs. 1 lakh.

Economic Evaluation

The cost and earnings per day of operation for different motorized fishing units worked out on the basis of the data collected from the sample units at major centres of each type of unit during 1992-93 have been worked out and presented in Table 4 & 5. For the larger ring seine units having a length of more than

500 meters operating with 2 engines of (40 HP and 25 HP), the average revenue per day of operation worked at Rs. 6100 and the operating cost Rs. 4131. The fixed costs which include the interest on investment, depreciation and annual insurance premium amounted to Rs. 937 per day. The net profit after deducting all costs including the interest on investment, depreciation and annual insurance premium amounted to Rs. 974 per day. The net profit after deducting all costs including the interest and depreciation worked out at Rs.1032.

For an average size ring seine (300 metres length and 65 metres breadth) with two engines of 25 HP each, the net profit is Rs. 974. For mini trawl (with 3 workers) it is Rs. 157, gillnet Rs. 110 and Hook & line it is Rs. 56/-. However, for traditional fishing units most of the workers are owner operators and their

Table 4. Average cost of earnings per day of operation of different motorised units during 1992-93

Types of units	Ring seine Large	Average	Mini trawl	Gill net	Hook & lines
A.Initial investment (Rs. in lakhs)	7.50	5.30	0.80	1.35	1.50
B.Revenue (Rs)	6100	5119	964	1085	1188
C.Operating cost					
Fuel	900	650	160	120	360
Wages	2445	2181	453	546	465
Auction	310	260	48	55	52
Commission					
Food & Bata	300	250		63	50
Repair & Maintenance	176	142	35	23	18
Total operating cost	4131	3338	696	807	945
D.Fixed costs (Rs)	937	662	111	168	187
E.Total costs(C+D)(Rs)	5068	4145	807	975	1132
F.Gross profit(B-C)(Rs)	1969	1636	268	278	243
G.Net profit(B-E)(Rs)	1032	974	157	110	56
H.Rate of return(%)	43	51	44	31	23

Table 5. Economic indicators (motorised units)

	Ring seine Large	Medium	Mini trawlers	Gill net	Hook & lines
Average landings per day of operation					
Quantity(Kgs)	870	730	27	68	80
Value(Rs)	6100	5119	964	1085	1188
No. of fishing days per year	200	200	110	220	220
Value realised (Rs/Kg)	7.15	7.00	36.00	16.5	14.85
Cost of production of fish (Rs/Kg)	5.82	5.67	30.00	14.34	14.15
Operating cost (Rs/Kg)	4.70	4.70	25.80	11.86	11.81
Returns to labour (Rs/labour day)	90	100	120	100	100
Net profit (per day)	1032	974	157	110	56
Rate of returns (returns to capital)(%)	43	51	44	31	23

returns include wages and net profit i.e., the amount left with owners after deducting all costs other than wages from the revenue received for the fish landed. Hence in a larger ring seine unit with 40 share holders each share holder who is also worker in the unit gets Rs. 90 per day of operation after deducting all costs including interest and depreciation, smaller ring seines with 30 share holders this comes about Rs. 100/-. In mini trawl with 5 share holders average returns worked out to Rs. 120 per day of operation. But, for mini trawl, number of operating days is only around 120 days, where as for ring seine it comes about 200 days so that the annual income for a ring seine share holder is much higher than that of a mini trawl. Even in gill net and hook & line units returns to labour worked out to about Rs.100 because the number of crew is

only 3 to 5. However, rate of return which indicates the profitability of the investment, is higher for ring seines, particularly for the average size ring seine unit and lowest for hook & line. The non-motorized sector is almost disappearing; its present level of contribution to the total landings of state is only 4%. At present about 2000 ring seines are under operation along Kerala coast.

During the year 1993 the average price realized per kg of fish (catch as a whole) caught in 850 ring seiners worked out to about Rs. 7/kg so that on an average one ring seine unit should catch about 400 kgs. per day to cover the daily operating expenditure including wages. Hence for the subsistence level of operation for 2000 units in a year of 200 operating days should catch 1.6 lakh tonnes in a year. During 1993 the total effort expended by ring seine units was

2,74,000 unit days. For 2000 units the average number of days operated in the year was only 135 days and total ring seine catch was 1.6 lakh tonnes. During 1994 the total ring seine catch reduced to 1.55 lakh and the effort also reduced to 220000 unit days. Thus the catch per unit per day of operation is about 770 kgs. By reducing the effort the uneconomic fishing days could be avoided and thereby the total cost of operation could be reduced. The fishermen themselves have realized the situation which reflected not only in the reduced tempo of expansion of ring seine operation but also in the attempts to reduce the size of units (length of gear, size of craft and HP of engine) for cutting down the operating costs. With the present level of catch and the prevailing prices, the 2000 ring seine units should control the fishing days so as to maintain 110 days of operation for each unit.

Indebtedness

One major criticism raised against the Motorization programme was that it increased the capital requirements of the traditional fishermen and thereby enhanced their burden of debt. It is true that the credit requirement increased but regarding the burden of debt there was no corresponding increase. With the advent of motorization even the outlook of traditional fishermen especially the new generation who were really responsible for the speedy development of motorization programme, had undergone a drastic change. They have become very much conscious about the profitability of the fishing unit they operate and have shown more responsibility for repayment of the loan taken for investment. Some of the studies conducted by CMFRI on the indebtedness among fishermen indicate

that earlier, loan taken for production purposes was only 20% of the total debts which increased to 55% in the early nineties. During seventies 80% of the credit needs of the traditional sector was catered by private money lender, that has now reduced to less than 40%. Institutional financing has been considerably increased not only because of some of the developmental schemes but also due to the improved credit worthiness of this sector.

Fish marketing

Before the motorization phase particularly before the introduction of ring seine operation, many of the rural fish landing centres which are the primary markets for the fish landings of the traditional sector, were mostly under the control of few traders. These traders used to play the role of money lenders also. There were a number of centres where a near monopsonic situation of marketing system was prevailing having only one or two traders to purchase the entire landings at that centre. But with the dominance of ring seine operation with its comparatively huge landings many traditional landing centres attracted more and more traders and the bargaining capacity of the traditional sector has been accelerated and it helped them to get better prices. With the result the share of fishermen in consumer rupee has been considerably increased as compared to that of early eighties for almost all commercially important varieties of fish.

Problem of Conservation

Motorization provided the facility of auto propulsion to the traditional fishing craft and consequently the traditional sector almost entirely shifted to the operation of ring seine (mini purse

seine) and mini trawlers, the gears so far used only by mechanized sectors. These gears as compared to traditional nets are highly efficient. Any type of fishing gear, more efficient means more destructive and so this is the first time that the problem of conservation has come up in the traditional sector. It is argued that the indiscriminate operation by these nets would definitely lead to depletion of some of the fishes of commercial importance. Because of the better economic performance, the size of craft and net as well as the HP of engines have been gradually increasing leading to higher investment as well as operating cost. Oil sardine is the major component of ring seine catch. The sharp decline in oil sardine catch in 1989 onwards very severely affected the income of ring seine units. By 1993-94 the operation of bigger units has become uneconomic and craze for bigger units in the hope of getting more fish and more income has disappeared. This indicates that, when fishing becomes uneconomic either due to the low level of landings or due to reduction in price the fishermen themselves will adjust to the new situation for their survival. They continue the operation of any fishing unit only till the operating cost can be covered by the value of fish caught.

Actually fishermen do not produce fish, they produce only effort. So when the return from a unit effort is less than the cost to produce it they will try to reduce the production of effort and so biological over fishing will not continue to reach the level of depletion. But in the case of those fishes for which there is continuously increasing demand with spiraling price trend, in the pursuit of trying to meet the demand, the fishermen may indiscriminately increase the effort

which will lead to the depletion of target species. Any sort of restriction is required only in such cases. Usually the exploitation of such resources will be dominated by the mechanized sector. Hence the restriction of the traditional sector in the name of conservation does not have much relevance.

Policy Implications

The advent of motorization and subsequently the introduction of ring seine operation in the traditional marine fishery sector of Kerala brought about far reaching changes in the various facets of marine fishery sector. Even though these changes appear to be economically beneficial to the traditional sector and also help to improve the quality of life of our fishermen, a number of issues have come up which demand immediate attention to maintain the sustainability of the benefits of these changes.

At present the traditional sector contributes 30% of the fishery exports of our state, with a lower import component as compared to mechanized sector. In the pursuit of increasing our exports Union Government is providing huge subsidies to many other sectors. Such encouragement for traditional marine fishery sector would not only increase our export earnings, but also for the socio-economic improvement of this sector, which is considered as most backward in our country.

The traditional sector required about 30 crores liters of kerosene oil for its fishing operation in a year. This is to be supplied to them at subsidized rates. Utilization of fuel energy for productive purposes is maximum in marine fisheries sector as compared to any other sector. Because of the technological developments recently taken place in the tradi-

tional sector, their credit requirement for investment purposes has been very much increased. It should be given due consideration and a viable credit policy should be formulated to create an adequate credit basis through institutional financing with easy terms and conditions.

The present fish marketing system and price structure do not provide any inducement to the traditional fishermen to increase fish production. Usually an

increase in the production some times due to abundance in the availability of one or the other species, do not help the fishermen increase his income. In such cases since the supply at any landing centre is highly inelastic there will be glut in the market which will slash down the prices. This can be rectified only by providing adequate storage, processing and distribution facilities.

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