

**SMALL-SCALE FISHERIES TRANSITION TO SUSTAINABLE AND RESPONSIBLE FISHING
IN INDIA - A MICRO LEVEL STUDY**

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ABSTRACT

Small-scale fisheries play an important role in generating employment, income and livelihood to the fisherfolk. It constitutes 81 per cent of the total fisheries sector in India. But, this sector remains neglected and the fisherfolk are socially and economically backward. Even after six decades of planned development nearly 62 per cent of the fisherfolk families do not possess crafts. Resource constraints coupled with absence of fishing and other related infrastructures in most of the fishing villages compel fishermen households to migrate to earn their livelihood. Migrant fishermen formed a new village and follow simple method of fishing, which are eco-friendly, economical in the use of fuel and gears. Their responsible fishing is useful for fishing without any by-catches and wastage of marine resources. With this theoretical background, this paper is framed in such a way to analyze the factors that contribute to the transition of small-scale fisheries to sustainable and responsible fishing in Tamil Nadu, India. Factors which hamper small-scale fisheries development have been discussed. The main focus of the study is on the impact of fishermen migration on the socio-economic status of migrants and also the sustainability of fishing operations without class conflict. Policy implications emerging in the light of the findings of the study are also given briefly.

Keywords: Small-scale fisheries, responsible fishing, sustainable fishing

In recent years, world fisheries have become a market-driven, dynamically developing sector of the food industry. Most of the coastal States have striven to take advantage of their new opportunity by investing in modern fishing fleets and processing factories in response to growing international demand for fish and fishery products. By the late 1980s it became clear, however, that fisheries resources could no longer sustain such rapid and often uncontrolled exploitation and development, and that new approach to fisheries management embracing conservation and environmental considerations were urgently needed. The situation was aggravated by the realization that unregulated fisheries on the high seas, in some cases involving straddling and highly migratory fish species, which occur within and outside EEZs, were becoming a matter of increasing concern.

Different countries are endowed with different quantities of natural, human and marine resources. The developed countries aim to sustain marine fisheries development by adopting various methods of resource management, while the developing countries try to enhance fish production and export by speeding up the process of motorization/mechanization. But the unbridled growth of mechanized boats and their indiscriminate fishing operations pose a severe challenge to the sustainability of marine resources and the livelihood of fisher people in countries like India. Absence of adequate infrastructures – basic, fishery, finance and marketing, deprive the fisherfolk from enjoying their entitlements. These situations pave the way for migration of fisherfolk to carry on their fishing operations throughout the year. Now the following questions arise: What is a small-scale fishery? What are their problems? Why they migrate? Do they follow the same methods of fishing at the place of destination? What are the impacts of fishermen migration? And in what ways their fishing operations are sustainable and responsible? The present study is an attempt to find fitting answers to the above said questions.

IMPORTANCE OF FISHERIES IN INDIA

India is blessed with abundant fishery resources, both marine and inland. The vast unexploited marine resources, which are replenishable in nature, have helped to transform the fishing activities from a mere subsistence level during pre-independence to a commercial fishery under the planning era. The role and potential of fisheries in the economic development of the country is very significant on the following grounds:

- Fisheries give a high nutritive food value at a cheaper rate;
- Fisheries contribute 1.07 per cent of total GDP (Rs.27,026 crores);
- It provides employment to 8,89,528 fishermen in fishing and 7,56,391 in fishing allied activities like fish processing, preserving, marketing, net making, boat building and others; [1]and
- It earns the much needed foreign exchange through exports to different developed countries like U.S.A and Japan. Considering the importance of fisheries in the above respects the Central Government has been allotting funds for fisheries development.

The objectives of the Marine Fishing Policy 2004 are:

- (1) To augment marine fish production of the country up to the sustainable level in a responsible manner so as to boost export of sea food from the country and also to increase per capita fish protein intake of the masses,
- (2) To ensure socio-economic security of the artisanal fishermen whose livelihood solely depend on this vocation, and
- (3) To ensure sustainable development of marine fisheries with due concern for ecological integrity and biodiversity.

But, so far no effort has been taken to fulfill the above objectives by framing and implementing suitable policies for the socio-economic uplift of the fisherfolk through responsible fishing to achieve sustainable livelihood in the years to come. At this juncture, the study of this nature becomes pertinent to provide data base regarding the success story of a fishing village, which happens to be a model to other fishermen with regard to responsible fishing practices. The focus of the present study is to bring to light the responsible fishing strategies adopted by the fisherfolk in the selected fishing village and to encourage fisherfolk in the other areas to follow the same practices for the peaceful co-existence of both traditional and mechanized fishing operations.

WHAT IS SMALL-SCALE FISHERIES?

Small-scale fisheries are labour-intensive and are conducted by artisanal craftsmen whose level of income, mechanical sophistication, quantity of production, fishing range, political influence, market outlets, employment, social mobility and financial dependence keep them subservient to the economic decisions and operating constraints placed upon them by those who buy their production". In short, fisheries, which consists of fisherfolk using traditional crafts with or without outboard engines are considered as small-scale fisheries. According to Kurien [2], small-scale fishery is one which is likely to have some of the following attributes:

- Use of small craft and simple gear of relatively low capital intensity;
- The fishing operations are skill-intensive;
- Operators have an intuitive understanding of coastal aquatic milieu and the fishery resource in it;
- The knowledge and skills are passed down from generation to generation;
- Scattered settlement pattern with relatively high population density;
- Fish close to their home communities in relatively near-shore waters;
- Considerable financial dependence on middlemen and those who buy their harvest;

- Compared with other sections of the society, relatively, socially and economically disadvantaged with low employment mobility out of fishing.

Problems of Small-Scale Fisheries

Marine resources are a common property in countries like India while the systems like giving quotas, issuing licenses for fishing and other fiscal weapons are prevalent in many developed as well as developing countries for sustainable use of the scarce resources. But due to manifold increase in the number of motorized and mechanized crafts the marine resources are put under severe pressure. The less-trained and ill-equipped traditional fishermen could not compete with the mechanized trawler operators. Competition among fishermen in the traditional, motorized and mechanized sectors, for increasing catch continuously paves the way for structural changes in the coastal economy. Fishermen households in the maritime States increased from 0.35 million in 1980 to 0.76 million in 2005. Fishermen population in the coastal villages increased from 2 million to 3.5 million during the same period. Active fishermen per village increased from 193 to 278 during 1980-2005. Structural change in marine fishing crafts operated in India is given below.

Table: I Number of Marine Fishing Crafts in India

Sl. No.	Category of Craft	Number of Crafts		Increase/ Decrease %
		1991	2005	
1	Traditional Crafts (NMC)	1,71,752 (68.37)	1,04,270 (43.67)	(-) 39.29
2	Motorised Crafts (MC)	44,578 (17.75)	75,591 (31.66)	(+) 92.00
3	Mechanised Boats (MB)	34,848 (13.88)	58,911 (24.67)	(+) 69.05
	Total	2,51,178 (100.00)	2,38,772 (100.00)	(-) 4.94

From Marine Fisheries Census (1991 & 2005)

Table-I indicates that the number of motorized crafts and mechanized boats have increased considerably within fifteen years. A remarkable development is that the number of traditional crafts has decreased. The decrease in total number of fishing crafts may be attributed to the sale of traditional crafts to purchase mechanized boats and also inter-district and inter-state migration of fishermen. But there were inter-State variations in the increase/decrease in the number of craft in operation. For instance, in India, Tamil Nadu has the maximum number of crafts of the country (18.69 per cent), the number of fishing crafts has increased by 610 per cent over a period of five decades [3].

A recent study shows that there are wide variations in length of coast line, continental shelf, number of landing centres and number of fishing villages. It shows that the Western region has 40.39 per cent of coast line and 70.38 per cent of continental shelf. This is one of the reasons for the major portion of fish production and export from this region. On the other hand, the Eastern region has 33.67 per cent of the coastline and 22.26 per cent of continental shelf. Further, this region has more than 50 per cent of fishermen villages and landing centres. Though the remaining areas have 25.94 of the coastline, they have only less than ten per cent of continental shelf, 3.92 per cent of landing centres and 2.27 per cent of fishermen villages. These situations have contributed much for the existing inter-state disparities in fisheries development.[4] The value of correlation coefficient (r) between fish production (Y) and number

of hooks and line (X_1) in the country is + 0.18 and number of trawl nets (X_2) is $r = + 0.63$. The high degree of correlation between Y and X_2 is a threat to the sustainability of fishery resources. There is the need to increase the number of hooks and lines to increase fish production in the country without causing problems to the sustainability of marine resources.

Ownership relations are one kind of entitlement^a relations. An entitlement relation connects one set of ownership to another through certain rules of legitimacy [5]. Sen speaks about (i) Trade-based entitlements, (ii) Production-based entitlements, (iii) Own-labour entitlements and (iv) Inheritance entitlements. Small-scale fisherfolks are deprived of the benefits, which may arise due to the above said entitlements. Different studies reveal that many national and international factors are responsible for such entitlement failures. Studies on fisheries economics (Kurien, 1980; Rao, 1983; Merlin, 1989; Eugene, 1990; Murickan, 1991; Dibakkar & Sahoo, 1992; Stephen, 1993; Arockiasamy, 1996, Pazhani, 1998, 2000, 2001) reveals the following factors as responsible for entitlement failures:

Natural Factors – Bad weather, cyclones, migration of fish, yearly variations in fish stock, growth and life period of fish, changes in demand, length of the lean season^b etc.

Social Factors – Marriage, dowry system, social conflicts, festivals, Sunday holiday.

Political Factors – Smaller outlay for fisheries development, failure to utilize allotted funds, non-availability of fuel subsidy for small-scale fishery, imposition of import duties on imported spares, failure to fix minimum price and minimum wages to fish and fishermen respectively and also neglect of fisherwomen while framing employment policies.

Economic Factors – i) Nature of employment, ii) Sources of income, iii) Conditions of Fishermen and Fisherwomen Co-operative Societies, iv) Non-availability of necessities, v) Insurance, vi) Fuel cost, vii) Input costs

Absence of infrastructures – Out of 3202 marine fishing villages only 142 (4.43 per cent) have fish landing centres and 38 (1.19 per cent) mini harbours were commissioned up to 2004. Only 1336 (41.72 per cent) villages have banking facilities, 905 (28.26 per cent) have ice factories, 108 (3.37 per cent) cold storages, 113 (3.53 per cent) freezing plants, 293 (9.15 per cent) have peeling sheds. Only 2067 (64.55 per cent) have health facilities in the coastal villages.

Marine fisheries operations remained essentially an inshore activity, till about the mid-1980s. Though fishing subsequently extended to the offshore areas, about 20 per cent of the total fish landings were from the offshore areas, which causes enormous fishing pressure on the coastal fishing stocks. Increasing competition between different fishing fleets as to who should have access to coastal fisheries resources and thereby benefit directly from the use of those resources is leading to conflicts and confrontation [6]. As a result, there is fall in employment and income of the fisherfolk and increase in the amount of debt. Non-availability of fish, social conflicts and also lengthy lean season make them to move internally and also internationally. A study conducted by SIFFS [7] reveals that the process of migration increases with the process of motorization and mechanization of fishing crafts. Of the total migrants from Kanyakumari district, 62.21 per cent were mechanized boat operators, 29.41 per cent motorized craft operators and only 8.38 per cent were non-motorised craft operators. The traditional fishermen have no other go except fishing in the inshore waters in their own village or migrating to other districts or States.

SUSTAINABLE MARINE RESOURCE USE

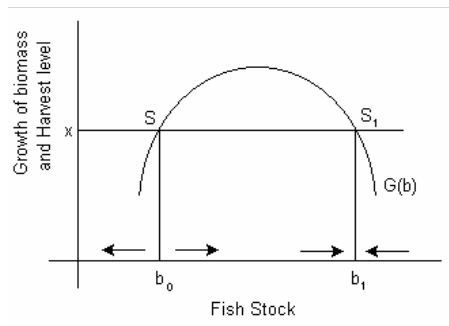
Marine resource use is the most important factor that influences the sustainable livelihood of fisherfolk. Higher prices and vastly improved techniques have brought tremendous catching power to bear against

fish stocks around the world. “Too much of fishers chasing too few fish” characterize fisheries in the world to try to regulate their fishing industries [8]. There is the need to manage fisheries arises from two situations. First, there is a need to limit the harvest to what the fish stocks can sustain. Second, property rights to fish stocks are difficult to establish, leading to intersectoral conflicts [9] A careful survey of available literatures (Thompson, 1989; Murickan, 1991; Singhal, 1992; Deveraj, 1995, Arockiasamy, 1996, Basavaiah, 1997, Lohmeyer, 1999; Maurstad, 1999) reveals the following facts:

1. Encroachment by the mechanized trawlers into the inshore waters leads to conflict between mechanized and traditional sectors.
2. Specialization on prawns which are available in inshore waters accessible to traditional fishing units led to conflict of interest.
3. The resources of the inshore waters (nearly 82 per cent) have been exploited to levels closer to the sustainable level and no further production would be possible from these
4. The profit-oriented commercial fishing would lead to the ruin of the fishery resource.
5. High prices offered by traders made the fishermen to fish until the nets started coming up empty and thus swallowed the livelihood of the small scale fishermen.
6. Over emphasis on export promotion in the context of natural resources like marine fisheries becomes self-defeating in the long-run.

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From these facts one could come to the conclusion that controlling expansion of fishing crafts is crucial for successful fisheries management. Willams [10] states, “In less than 50 years the world’s average per capita consumption of fish has almost doubled, while those who catch, grow, process, trade and consume fish have changed almost beyond recognition. As overall demand for an adequate supply of fish continues to increase, we are forced to face the fact that this level of demand may not be met. Trying to meet may cause long-term, irreversible damage to the environment and limit the future options of many people”. To avoid this situation, according to Neher (1990), maximum sustainable yield (MSY) ^b should be the “objective” or “scientific” criterion for fisheries management. To him, the natural growth of the biomass (G (b)) is a function of the level of fish stock (b). He has explained the dynamics of population growth by using a growth curve G (b).



In the figure,

x = Harvest level
 $G(b)$ = Biomass Growth curve

At x level of harvest there are two suitable stocks of the biomass wherein natural growth exactly replaces the harvest. They are indicated as b_0 and b_1 . If fish stock lies below b_0 , the harvest level (x) exceeds the growth of biomass ($G(b)$) and so fish stock is falling. Hence b_0 is an unstable sustainable stock. Contrary to this, if fish stocks are greater than b_1 , x exceeds $G(b)$ and so fish stock is falling. For stocks between b_0 and b_1 , $G(b)$ exceeds x , so fish stock (b) is rising. Hence b_1 represents a stable

sustainable stock. It indicates that increase in fishing operations will help for the sustainable livelihood of fisherfolk till point S_1 is reached where natural growth exactly replaces the harvest. Thus, the figure reveals that changes in the resource base may have consequences for fertility rates, and so may affect the future of the resource base. According to Smith [11], the recovery or harvesting process is subject to different externalities ^c. Environmental problems are almost always associated with resources that are regenerative (that is renewable) but in danger of exhaustion from excessive use. [12].

Though fishery resources are replenishable in nature it could not be exploited without any limit. Regulation of mesh size of gears is often emphasized to protect the young fish and to regulate the size of fish caught. It is argued that if fishing on immature fish is intense, the abundance of the species may be reduced before it approaches maturity there would be insufficient adult fish surviving even if there is no fishing on them [13]. According to Watson and Getz [14], regulation of fishery is difficult unless all aspects of fishery activities are specified. They have suggested the following as regulatory measures:

- (i) Limiting fishing to a few months reduces the amount of fishing efforts that can be applied;
- (ii) Regulations of fishing efforts, detailing the kinds of boats, the kinds of fishing gear, the season and hours of fishing should be made;
- (iii) Limiting fishing vessels to large mesh; and
- (iv) Induce firms not only to choose the optimum amount of fishing efforts but also the optimum mesh size.

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Regulation of fishery should not be a top to bottom measure. The Governments at the Centre and the State should be try to get the opinion of the fishermen, who are the heart and soul of the fishing industry and the Committees formed for this purpose should be represented by the members of fishermen from all the maritime States/Union Territories.

RESPONSIBLE FISHING

Responsible fishing means fishing with responsibility to ensure long-term sustainability of living aquatic resources, with due respect for the ecosystem, biodiversity and environment. The following activities are considered as irresponsible fishing:

- Polluting the marine environment while fishing
- Destructive fishing practices
- By-catches and discards
- Juvenile fishing
- Ecosystem damage or destruction while fishing
- Over-fishing
- Non-selective fishing

But, fishermen in the study area use only hooks and lines. Of the several types of traditional fishing methods, the hooks and lines formed one of the most dominant and economically viable fishing technique to exploit large pelagic, column and demersal predator fishes [14]. There are 2,47,107 hooks and line units in India, which is the second dominant gear for marine fishing, next to drift/gill net with maximum number in Tamil Nadu (56.68 per cent) followed by Andhra Pradesh (19.55 per cent) and Orissa (7.63 per cent). Local communities have usual conventions for sustainable use, and the magnitude of their use meant for subsistence is also within sustainable limits. It is the arrival of new commercial interest that changes the situation radically [15]. The open access nature of marine capture fisheries is one of the major reasons for depletion, economic waste and conflict among user groups. Without adequate control

over access, these consequences will become increasingly severe and further impede the sustainable management of fishery and the resource.

PROFILE OF THE STUDY AREA

Kombuthurai is a small coastal village situated in the Coramendal coast area of East coast of the Indian Peninsula in Thoothukudi district, Tamil Nadu. There are 141 fishermen households with a total population of 698, of which 220 are adult males and 191 are females. The average family size is 4.95. Out of this 494 (69.23 per cent) are literates and 204 (30.77 per cent) are illiterates. Out of 441 adults, 192 (43.54 per cent) are engaged in fishing and only 7 (1.59 per cent) in fishery related activities. Thus, only 199 (48.42 per cent) are employed and 212 (51.58 per cent) are remaining unemployed. Of the unemployed 187 (88.21 per cent) are fisherwomen. The author has purposely selected this coastal village for the present study due to the following reasons: (i) They use only one type of fishing craft, namely, vallam with outboard engines, (ii) It is the only village that exclusively concentrates on hooks and line fishing in India. The main focus of the study is to analyse the methods of fishing followed to achieve sustainable fishing and their impact on the socio-economic uplift of the fishermen households.

Fishing Methods

Though there are traditional crafts like catamarans and vallams and mechanized boats in Tamil Nadu, fishermen in the study area use only Vallam fitted with outboard engines (Model 9.9, Yamaha & Suzuki 15 HP). One peculiar feature found in the study area is that they are the people who exclusively use 2404 (9.94 per cent in the district) hooks and lines for fishing throughout the year. It is mainly because of the following reasons:

- Economical in the sense that it requires less investment on fishing gears and fuel efficient;
- Helps for selective fishing;
- No disturbance from other traditional and mechanized craft operators;
- Using fish as baits;
- Gain much from the experience of their parents;
- Landings are fresh, which fetch better price and revenue both to the owner-worker and the crew.

Each vallam is specially designed^d so as to bring fish alive or fresh. They use small fishes as bait to catch fishes. To catch big size and high-valued fishes like sheela, parai, pandari etc., they use imported colour plastic fishes. Their fishing assets consist of fishing craft, gear, outboard engine, GPS12 with cell. For starting a new fishing unit they require Rs.2.75 lakhs (For fishing crafts Rs.1,50,000 (54.55 per cent), fishing gear Rs.25,000 (09.09 per cent), outboard engine Rs.90,000 (32.73 per cent) and others accessories Rs.10,000 (03.63 per cent). But for other types of fishing gears the amount invested comes to Rs.1,00,000 (34.67 per cent) out of the total investment of Rs.2,97,000.

The fishermen in the study area have identified and numbered 120 coral reefs. With the help of Global Positioning System (GPS12) they reach the fishing ground very easily. It helps to economize the use of time and money in the form of fuel and labour. Considering the wind, weather and forecast by the concerned department, fishermen go for fishing. On an average, their number of fishing days comes to 165 days. They have reported that the average value of daily catch of the study area is Rs.5/- lakhs per day. But, the average value of landings by individuals range from Rs.4.5 lakhs to Rs.14/- lakhs per year. Few fishermen migrate to distant areas like Mandapam for two to three months.

Table: III Month-wise and Sangam-wise Fishing Days and Catch of Hooks and Lines Fishing during 2009

Months	St, Stephen Fishermen Welfare Sangam		St.Xavier Fishermen Welfare Sangam		Christ King Fishermen Welfare Sangam		Total Catch
	No. of Fishing days	Catch (Kg.)	No. of Fishing days	Catch (Kg.)	No. of Fishing days	Catch (Kg.)	
January	24	5277	23	13189	7	3320	21786
February	16	6234	21	15594	20	9290	31118
March	24	14240	24	34119	24	20152	68511
April	15	4726	17	16418	18	10832	31976
May	18	3215	20	9482	17	7520	20217
June	14	3719	18	9851	15	4923	18493
July	19	7862	18	20246	22	11555	39663
August	19	7293	22	12526	20	10086	29905
September	16	5134	19	10097	22	5982	21213
October	25	5707	25	18773	25	10874	35354
November	22	5049	21	13073	20	7887	26009
December	17	1802	18	18552	17	5029	25383
Total	229	70258	246	191920	227	107450	369628

From the Records of Fishermen Welfare Sangams (2009)

The above table clearly reveals the month-wise and sangam-wise variations in fish production in the study area. In all the three sangams, fishing days and also total fish catch is less due to the lean season (April – June). The average fish production in all three sangams put together comes to 1580 Kg. per day. This much of fish production could not be achieved in the case of traditional crafts using other types of fishing gears in other areas. It is mainly due to the type of fishing gears they use and the area of fishing (near-shore).

The important species available are Seer fish *Barracuda sp*, Parai *Carangid sp*, Kalawa *Epinephalus sp*, Tuna *Tuna sp*, Skates, *Yellow fin*, Kanava *Squid* and some small species used for domestic consumption and baits. Out of the varieties Seer fish and carangid are mostly caught on almost all seasons. The average weights of fishes vary from a minimum of 2 to 5 Kg in the case of Squid to 20 to 120 Kg of Tuna. Similarly, average price also varies with the maximum of Rs.200 to Rs.650 per Kg of Seer fish to a minimum of Rs.25 to Rs.30 per Kg of Skates. Seer fish and Crangid are mostly available throughout the year. If they get more of these varieties, they never try to catch other fishes. Price per kilogram of fish is fixed on the spot through auctioning. If more merchants visit on a day there is the possibility of getting better price. On an average the number of fishing days varies from a minimum of 15 days on June to 25 days on October. The sample respondents attributed this fall in working days to non-availability of kerosene in adequate quantity at reasonable price (35 days) and ice blocks (25 days), weather and cyclone announcement by the concerned department (25 days), first Fridays (12 days) and also Sundays (52 days). The remaining days are used for visiting their place of origin to attend church festivals and other social ceremonies.

Expenditure and Income

On an average each fishing craft requires 25 to 40 litres of kerosene per craft per fishing trip. In order to reduce fuel cost during March and April, they stay in the sea for two days. During the stay they anchor the craft in a particular spot, if necessary sometimes they use sails. In such a case, it will take three days per trip. Thus, there is the possibility for two trips per week, which requires 150 litres per week. This method is economical than going for fishing every day (40 litres X 6 days = 240 litres).

The average income (Gross) per fishing craft comes to Rs.8,91,800/-, of which Rs.2,31,800/-(25.99 per cent) has been spent on fuel and the remaining amount (Rs. 6,60,000/-) is divided into 6 share (Two for ownership of crafts and OBEs and four for crews). The class structure in the sample village consists of two groups only – (i) Owner-worker, and (ii) Crew members. A recent study reveals that there is a possibility of increasing net profit if there is an increase in fishing time in unexploited fishing ground [16]. The fishing activities of the sample respondents give testimony to this.

A owner-worker gets three shares (Rs.3,30,000/-) while the other three crews get Rs.1,10,000/- each. The owner-workers reported that if the Government comes forward to supply kerosene at Rs.8/- (Public Distribution System Rate), it will help to reduce their fuel cost by 75 per cent. For instance, if the price of kerosene per litre is fixed at Rs.16/-, the fisher people can reduce their fuel cost by 50 per cent (Rs.1,15,900/-). The money saved in this way can be used for the settlement of loans borrowed. Out of 94 households surveyed, in 10 households two members are engaged in fishing. So they are entitled to get four shares (Rs.4,40,000/-). This is one of the reasons for the increasing dropouts of male students at the school level itself.

Impact of Responsible Fishing

Transition of both mechanized and motorized crafts to responsible fishing is the need of the hour to protect the highly fragile eco-system is the way forward to save our sea. From the above discussion one can deduce the following positive impacts of responsible fishing:

- Sustainable fishing;
- Fall in investment in gears (Rs.25,000 instead of Rs.1,00,000 in other villages);
- Fishing only for an average of 155 days in a year, which give enough time for breeding;
- Obey the calls given by the Fisheries Department and avoid bad incidences like death;
- Fish only targeted species which are matured enough, avoid by-catches and post- harvest wastages;
- There is no juvenile fishing under this method;
- High-valued and exportable species are caught, which fetch better price to the exploiters and avoid pressure to catch more fishes;
- Formation of Fishermen Welfare Sangams to avoid exploitation and to free the member fishermen from the clutches of the moneylender-cum-fish traders;
- A situation for collective action and awareness is being created regarding prompt repayment of credit through marketing linked credit.⁶
- Increase in employment and income compared to their place of origin.
- Reasonable sharing system prevailing in the study area helps to reduce the inequalities in income distribution.

POLICY IMPLICATIONS

To encourage responsible fishing to achieve sustainable fishing in general and Kombuthurai in particular not only the Government of Tamil Nadu but also the Government of India should take the following necessary and sufficient steps:

1. To reduce the population pressure on marine resources:
 - increase the literacy rate in the coastal villages;
 - increase the facilities such as doctors, nurses, medicines in the Primary Health Centres to provide free medical facilities to these poor;
 - creating awareness through various camps regarding the defects of large family and child labour.

2. To increase the number of fishing crafts using hooks and lines method of fishing:
 - Nationalized banks should lend liberally at differential rate of interest
 - Group lending by the National Co-operative Development Corporation (NCDC) should be increased
 - Loans should be routed through the village fishermen sangams, which recover the loans by linking credit with marketing.

3. Fishermen expect supply of kerosene at a price charge, which will reduce the expenses on fuel to a maximum of 50 per cent.
4. To ensure reasonable price for their daily landings, adequate supply of ice blocks and if possible freezing plants should be made available.
5. Two or three youths from each village has to be given training regarding repairing the outboard engines.
6. The fish stock in coastal waters has been under pressure. Rational exploitation of these stocks need to be considered on regional Maximum Sustainable Yield basis. To achieve this, surveys have to be undertaken to measure the availability of different species in different regions.
7. To increase fish production in a sustainable way so as to earn the much needed foreign exchange
 - at least 10 groups of fishermen (10 X 4 = 40 fishermen) from each village should exclusively follow hooks and line fishing. It will help to involve 32020 groups (1,28,080 fishermen)^f in hooks and lines fishing in the country as a whole.
 - latest developments in hooks and lines should be made available to them;
 - satellite information regarding the availability of fish should be provided by the Fisheries Department or Fisheries College whenever possible.

8. Due importance should be given to fisherwomen while framing employment policies.
9. Landing facilities such as mini fishing harbours or jetties should be constructed with all required facilities.
10. The priority of coastal fisheries development has to shift from increasing fish production to sustain them by addressing the problem such as increasing fishing intensity, over-capitalisation, declining stocks, conflict between fishing sectors and habitat and resource degradation.

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CONCLUSION

According to Pope (1982), "The health of a fishery must be judged by the catch of fish, the viability of the fish stock which yields the catch, the profitability of the fishing vessels, and the earnings and employment prospects of the men employed in the industry." Keeping these things in mind efforts should be taken to introduce a well-defined property right, ban on fishing for few months, fixing the mesh size of the gears to be used and limiting the hours of fishing to achieve sustainable use of marine resources. The attitude of fishermen in the study is showing an inclination towards responsible fishing should be made aware of to the fishfolk in other fishing villages of all the maritime States. Hence, fisheries development and management should be integrated in their approach; not as a catch-phrase, but as a process, and make sure that sound prioritization of issues to be addressed, and step-wise bottom-up implementation, should take place for the betterment of the fisherfolk and the nation as a whole.

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ENDNOTES

- a. Entitlements
- (i). Trade-based entitlement: "One is entitled to own what one obtains by trading something one owns with a willing party (or, multilaterally, with a willing set of parties)".
 - (ii). Production-based entitlement: "One is entitled to own what one gets by arranging production using one's owned resources, or resources hired from willing parties meeting the agreed conditions of trade".
 - (iii). Own-labour entitlement: "One is entitled to one's own labour power, and thus to the trade-based and production-based entitlements related to one's labour power".
 - (iv). Inheritances and transfer entitlement: "One is entitled to own what is willingly given to one by another who legitimately owns it, possibly to take effect after the latter's death (if so specified by him).
- b. MSY refers a steady growth of fish stock because "sustained" means "sustained forever" unless biological conditions change. It is defined as:
- $$MSY = G(b) - x = 0. \text{ (Neher, 1990)}$$
- Where, MSY = Maximum Sustainable Yield
 G (b) = Growth of Biomass (fish)
 x = Harvest level.
- c. Externalities refer to the external diseconomies to the firms in the fishing industry from external factors. They are of three types:
- (i) *Stock externalities* – cost of fish catch increases as the amount of fish catch decreases.
 - (ii) *Mess externalities* – It arises if the mesh size affects not only the private costs and revenues of the fisherman but also the growth behaviour of fish population.
 - (iii) *Crowding externalities* – It occurs if the fish population is sufficiently concentrated to cause vessel congestion over the fishing ground and paves the way for increased operating cost for any given catch.
- d. Each craft has two boxes (1.5' depth and 5' width) having holes for the free flow of sea water in side the boxes to keep the fish alive or fresh. It also contains a store room with a capacity to store 400 – 500 kg of fish and six ice blocks. These facilities are much useful to stay in the sea for two nights to catch more fish.
- e. A credit system successfully implemented by South Indian Federation of Fishermen Societies through district level Fishermen Sangams Federations which have a net work of village level Fishermen Sangams to provide micro finance to the member fishermen in the traditional sector by linking credit with marketing. The loan will be regularly recovered while giving the sale proceeds of the daily landings through the Sangams.
- f. 3202 fishing villages X 40 per village = 1,28,080 fishermen ÷ 4 per group = 32020 groups. These groups may help to increase fish production by engaging in deep-sea fishing with hooks and lines without affecting the sustainability of marine resources.