

Evaluation of the post-tsunami scenario with reference to fishing technology and socio-economic conditions among the motorized craft operators in Tamil Nadu

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ABSTRACT

This paper looks at the data and literature on socio-personal profile, assets, fishing craft and gear, fish catch and income, impact of tsunami, adequacy of rehabilitation efforts and the general constraints among motorized craft operators in Cuddalore and Nagapattinam districts in Tamil Nadu. The number of fishing days in a year was 273.81 and 274.38 in Cuddalore and Nagapattinam respectively. The average investment on craft and gears was Rs. 2.43 and Rs. 2.13 lakhs respectively. Significant changes could be observed in the value of assets, value of craft and gears, investment and indebtedness in the pre- and post-tsunami periods. Ownership pattern has also changed considerably. The other changes in the post-tsunami period were, increased hours of operation, increased number of crafts and introduction of inboard *vallams* and ringseine operation. Changes have also taken place from single day fishing to trips of three days and two nights, especially in Nagapattinam district. Changes in craft and gear designs were also observed, as of now, larger crafts of 29-30 ft OAL are in operation, compared to 27 ft OAL crafts which were in operation in the pre-tsunami period. More than 90% of the respondents in both the districts were satisfied with the adequacy of post-tsunami mitigation measures. Increasing operational expenditure, especially the fuel prices, inadequate fuel subsidy, labour shortage, poor quality of the FRP crafts fabricated in haste and issued after tsunami, diminishing catches and competition for limited resources were reported as significant constraints by majority of the respondents in both the study areas.

Keywords: FRP crafts, Livelihood, Mitigation measures, Motorized craft operators, Socio-economic status, Tsunami.

Introduction

The devastating tsunami in December 2004 that swept along the coast of Indian Ocean region had unprecedented consequences on human populations and natural systems along the coasts and islands of the region. The coastline of India was seriously impacted and led not only to a large-scale destruction of housing and infrastructure but also affected the fragile coastal ecosystems and resulted in the loss of thousands of human lives, assets, livestock and crop (Rodriguez *et al.*, 2008). Several significant changes followed the tsunami, influencing many facets of coastal planning and governance (Sridhar, 2006).

The magnitude of damages in the coastal districts of Nagapattinam, Kanniyakumari and Cuddalore was very severe and in the coastal areas in Chennai, Kancheepuram and Tiruvallur districts it was severe. Due to this sudden attack of tsunami, a large number of fishermen living in coastal areas have been affected severely and thousands of them lost their lives and their means of livelihood. In this catastrophe, lakhs of people lost their houses/huts and were rendered homeless. This tsunami caused heavy damages both to the belongings of fishermen *viz.*, catamarans,

vallams, mechanized boats, fishing nets and belongings/properties of the non-fishermen communities living along the coast of Tamil Nadu. Due to the havoc caused by tsunami, 373 villages were affected. Further, there were 8036 human losses, 16519 cattle loss, and 3136 persons suffered grievous injuries. There were damages to 1.5 lakh dwellings, 35,530 catamarans, 11,118 *vallams*, 4,430 mechanized boats and 2000.69 M.T of fishing implements. Fishing harbours, fish landing centres, infrastructural facilities like diesel bunks installed in the coastal villages, prawn farms and hatcheries, and two patrol boats of the fisheries department have also been severely damaged. In the study area, the extent of damage was reported as 90% to the infrastructural facilities in the fishing harbor/landing centre including the silting problem which needed frequent dredging. In Cuddalore district, the extent of damage included 610 number of deaths, 38 number of man-missing and 949 cattle death. At Devanampattinam fishing village in Cuddalore district, the damage included 95 human losses, total damage of 46 crafts and partial damage of 44 crafts.

The Tsunami assistance provided by the Government includes three packages *viz.*, A) for traditional fishermen:

Rs. 32,000/- for total replacement; package includes one catamaran and nets worth Rs. 10,000/-, B) for *vallam* categories, a) FRP/ wooden *vallam*- fully damaged; unit cost Rs. 1.5 lakh; subsidy 75,000/- and Loan Rs. 75,000/- (FRP *vallam* + OBM+ nets) and b) for partly damaged; maximum Rs. 40,000/- which includes Rs. 20,000 for nets, Rs. 15,000 for repair of *vallams* and Rs. 5,000 for repair of OBM. This package was given as full subsidy and not in the form of loan.

There have been several rapid post-tsunami socio-economic studies and diverse form of rehabilitation activities. Rehabilitation efforts that are based on poor socio-economic data can have the potential to promote inequity and also adversely affect resource use. The various rehabilitation efforts must also be evaluated to assess the impacts of such action on the coastal and marine ecosystems. Therefore it was felt important to document the views of the local communities on fishery resources, resource management, rehabilitation, and the impacts of the tsunami. About four months after the tsunami, it was increasingly becoming evident that in the artisanal fisheries sector, the total number of crafts would exceed pre-tsunami levels. This trend would prove counter productive, as fish catches from Tamil Nadu had stagnated for the last few years, and would not result in increased catch or income. This situation would actually lead to over capitalization, uneconomic operations and even resource depletion (George, 2005). With this background, this paper looks at the data and literature on assets, fishing craft and gear details, fish catch and income data to understand the post-tsunami scenario with reference to fishing technology and socio-economic conditions among the motorized craft operators. The impact of tsunami, adequacy of rehabilitation efforts and the general constraints were also reviewed and analyzed.

Materials and methods

The study covered two fishing villages *viz.*, Sonanguppam and Devanampattinam in Cuddalore district and two fishing villages *viz.*, Akkaraipettai and Serudhur in Nagapattinam district of Tamil Nadu. Data were collected from a randomly selected sample of 42 motorized craft operators in Cuddalore and 40 motorized craft operators in Nagapattinam districts. Both qualitative and quantitative tools were used. Quantitative data were collected using structured and pre-tested interview schedules. Qualitative observations and the findings from review of available literature were also noted down. The socio-economic variables *viz.*, age, experience in the field, number of fishing days in a year, investment on fishing craft and gears, ownership pattern, family size, type of houses, material possession, average annual income and expenditure were studied. The data on the variables *viz.*, social participation,

extension participation, mass media exposure, innovativeness and economic motivation were measured through indices developed for this study. Standard statistical tools were used for analysis of data.

Results and discussion

The data on socio-personal profile of motorized craft operators in Cuddalore and Nagapattinam districts are presented in Table 1.

The mean ages of the respondents were 39.00 and 40.60 with the occupational experience of 19.26 and 20.15 years in Cuddalore and Nagapattinam respectively. The number of fishing days in a year were 273.81 and 274.38 in the above districts. The average investment on craft and gear was Rs. 2.43 and Rs. 2.13 lakhs respectively. More than 90% of the respondents were owners of the crafts and having fishing alone as their occupation. There was no significant difference among them on the variables *viz.*, occupational status, experience, number of fishing days, investment on fishing craft and gears, ownership pattern, family size, types of houses, material possession, social participation and economic motivation. However, significant differences could be observed among the respondents between the two districts pertaining to the variables *viz.*, family income, family expenditure, extension participation, mass media exposure and innovativeness. The net annual income among the respondents ranged from Rs. 20,000/- to Rs. 60,000/- in Cuddalore and from Rs. 25,000/- to Rs. 90,000/- in Nagapattinam district.

All the respondents of the study owned fibre re-inforced plastic (FRP) motorized crafts with 9-11 hp outboard engines. The major type of gear used was gillnet and depending on the species, different types of gillnets were used. The investment on the fishing unit ranged from Rs.1.70 to Rs.2.70 lakhs for one FRP craft (28 to 30 ft OAL; 4.5 to 5 ft breadth), one outboard engine of 9-11 hp and 350 kg of gillnets. They also operate hooks and lines and ring seines. On an average, 10-15 l of fuel is consumed for daily trips to cover 20 km, with an expenditure of Rs. 500/- per trip. Voyage trip of three days and two nights with the fuel consumption of 50-60 l is also in practice. On an average four blocks of ice (one block = Rs. 50/- for 50 kg) are taken for voyage trips. The total expenditure comes around Rs. 4000/- per voyage .

The impact of tsunami on fish landing, marketing and social consequences as perceived by the respondents are presented in Table 2.

Nearly 70% of the respondents in Cuddalore district reported that there was a decline in the landings after the tsunami, though the respondents from Nagapattinam reported otherwise. All the respondents in both the districts

Table 1. Socio-personal profile of the motorized craft operators in Cuddalore and Nagapattinam districts

Variables	Cuddalore District (n=42)				Nagapattinam District (n=40)				't'
	Mean	SD	No.	%	Mean	SD	No.	%	
Age (Years)	39.00	8.46	-	-	40.60	8.46	-	-	0.856
Occupation									
a) Fishing alone	-	-	38	90.48	-	-	37	92.50	-
b) Fishing + others	-	-	4	9.52	-	-	3	7.50	-
Experience in the field (Years)	19.26	8.09	-	-	20.15	7.84	-	-	0.504
Number of fishing days in a year	273.81	34.81	-	-	274.38	27.34	-	-	0.082
Investment on fishing craft and gears (Rs. in lakhs)	2.43	0.50	-	-	2.13	0.30	-	-	3.285**
Ownership pattern									
a) Owner	-	-	38	90.48	-	-	37	92.50	-
b) Shareholder	-	-	4	9.52	-	-	3	7.5	-
c) Labourer	-	-	0	0.00	-	-	0	0.00	-
Family size (No. of family members)	5.21	1.34	-	-	5.78	1.42	-	-	1.841
Type of houses									
a) Concrete	-	-	12	28.57	-	-	10	25.00	-
b) Tiled	-	-	25	59.52	-	-	25	62.50	-
c) Thatched	-	-	5	11.90	-	-	5	12.50	-
Material Possession (Value in Rs. Lakhs)									
a) Assets	1.41	1.27	-	-	1.44	1.29	-	-	0.056
b) Household articles	0.32	0.22	-	-	0.24	0.21	-	-	1.387
Average annual net family income (Rs. in Lakhs)	0.40	0.11	-	-	0.34	0.16	-	-	2.097*
Average annual family expenses (Rs. in Lakhs)	0.38	0.11	-	-	0.32	0.11	-	-	2.649**
Social participation (Scores)	1.52	0.83	-	-	1.55	0.60	-	-	0.163
Extension participation (Scores & Index in %)	0.45	0.55	-	7.5	1.00	1.54	-	16.67	2.170*
Mass media exposure (Scores & Index in %)	6.81	3.08	-	34.05	8.40	3.91	-	42.00	2.053*
Innovativeness (Scores & Index in %)	1.64	0.62	-	54.67	2.03	0.62	-	67.67	2.796**
Economic motivation (Scores & Index in %)	24.38	3.04	-	81.27	25.2	3.32	-	84.00	1.166

Table 2. Perceived impact on fish landing, marketing and social consequences

Impact factors	Cuddalore District (n=42)				Nagapattinam District (n=40)			
	Yes		No		Yes		No	
	Number	%	Number	%	Number	%	Number	%
Drop in landings after tsunami	29	69.05	13	30.95	15	37.50	25	62.50
Hike in landings after tsunami	9	21.43	33	78.57	25	62.50	15	37.50
Drop in demand for fish after tsunami	0	0.00	42	100.00	0	0.00	40	100.00
Drop in price of fish after tsunami	0	0.00	42	100.00	0	0.00	40	100.00
Hike in price of fish after tsunami	15	35.71	27	64.29	35	87.50	5	12.50
Change in the taste/ quality of marine fish after tsunami	0	0.00	42	100.00	0	0.00	40	100.00
Urbanization/ migration after tsunami	17	40.48	25	59.52	1	2.50	39	97.50
Changes in health, sanitation, nutritional status and outbreak of any diseases after tsunami	0	0.00	42	100.00	0	0.00	40	100.00

reported there was no drop in demand for fish, no crash in price of fish, no change in the taste or quality of fish and no changes in health, sanitation, nutritional status and outbreak of any diseases after tsunami. Nearly half of the

respondents in Cuddalore reported urbanization/migration after tsunami where as it was not the case in Nagapattinam. However, an earlier study (Gomathy, 2006) at the fishing villages in the Gulf of Mannar reported that the amount of

catch as well as variety of fish had significantly declined after the tsunami. But Nagapattinam and Karaikal villages reported no such reduction. A report of the Department of Fisheries, Govt. of Tamil Nadu says that in Nagapattinam district, on an average, the catch per FRP craft has declined by 2%, from 150 kg per craft in the pre-tsunami to 110 kg per craft in the post-tsunami period. The average fish catch per day was 484 t in the pre-tsunami, contributed by 3230 FRP crafts, and it was 563 t in the post-tsunami period, contributed by 5126 FRP crafts.

The impact on livelihood/socio-economic status as perceived by the respondents are presented in Table 3.

Table 3. Impact on livelihood/ socio-economic status

Item	Cuddalore District (n=42)					Nagapattinam District (n=40)				
	Before tsunami		After tsunami		't'	Before tsunami		After tsunami		't'
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Asset value (Rs. in Lakhs)	1.22	1.23	1.41	1.27	3.266**	1.32	1.07	1.44	1.29	1.974*
Value of household articles (Rs. in Lakhs)	0.30	0.21	0.32	0.22	1.701	0.25	0.23	0.24	0.21	1.000
Value of craft and gears (Rs. in Lakhs)	1.40	0.95	2.43	0.50	8.915**	0.74	0.72	2.13	0.30	14.518**
Ownership										
a) Owner (Number and percentage)	26	61.90	38	90.48	-	27	67.50	37	92.50	-
b) Shareholder (Number and percentage)	13	30.95	4	9.52	-	10	25.00	3	7.50	-
c) Labourer (Number and percentage)	3	7.14	0	0.00	-	3	7.50	0	0.00	-
Average annual net family income (Rs. in Lakhs)	0.43	0.18	0.40	0.11	1.883	0.32	0.16	0.34	0.16	1.138
Average annual family expenditure (Rs. in Lakhs)	0.37	0.11	0.38	0.11	1.355	0.30	0.12	0.32	0.11	2.306*
Investments	1.40	0.95	2.43	0.50	8.915**	0.74	0.72	2.13	0.30	14.518**
Indebtedness	0.00	0.00	0.40	0.15	5.790**	0.00	0.00	0.33	0.14	2.729**

In case of the fishermen respondents from Cuddalore, significant changes could be observed in the value of assets (Rs. 1.22 and 1.41 lakhs), value of craft and gears (Rs. 1.40 and 2.43 lakhs), investment (Rs. 1.40 and 2.43 lakhs) and indebtedness (Rs. 0.00 and 0.40 lakhs) in the pre- and post-tsunami periods respectively. Ownership pattern has also changed considerably. The same trend was observed in the case of Nagapattinam district also. Significant differences could be observed in the value of assets (Rs. 1.32 and 1.44 lakhs), value of craft and gear (Rs. 0.74 and 2.13 lakhs), investment (Rs. 0.74 and 2.13 lakhs), indebtedness (Rs. 0.00 and 0.33 lakhs) and ownership pattern (67.50% and 92.50% as owners) in the pre- and post-tsunami periods respectively. In Cuddalore district, the number of FRP crafts increased from 860 to 1600 in the post-tsunami period. At Serudhur fishing village in Nagapattinam district, the number has increased from 146 to 250.

For most of the respondents, the ownership pattern has changed from non-motorized craft operator to a motorized FRP craft owner or from a share holder to an owner. The other changes in the post-tsunami period were,

increased hours of operation, increased number of crafts and introduction of inboard vallams and ringseine operation from Kerala. Changes have also taken place in fishing pattern, from single day fishing to voyage trip of three days and two nights, especially in Nagapattinam district. Changes in craft and gear designs were also observed, as of now, larger crafts of 29-30 ft OAL are in operation, compared to 27 ft OAL crafts which were in operation in the pre-tsunami period. Ringseine operation has come into existence only after tsunami, especially in Cuddalore district, which is reported as a serious issue, as other fishing unit are not getting any catch and they want it to be banned. Ringseine

operation, with one inboard vallam and six to ten FRP crafts, operate in a 600 m circumference and 75 m depth, mainly for sardine catch. On an average, 20 ringseine units are in operation in Cuddalore.

When looking at the composition of the asset base in the traditional sector, there was an initial decrease in the number of catamarans which were replaced by the FRP crafts. This was because in Tamil Nadu, catamaran damages and losses were paid in full and proof did not have to be attached. In fact, a study cites the reason for this situation as compensation being in excess of the pre-tsunami levels (Salagrama, 2006). However, very few wooden catamarans were replaced and most fishers shifted to FRPs. One of the reasons was due to the immediate non-availability of wood (in terms of scale) and that replacement and provision of FRPs were much easier than catamarans. Secondly, there was also a lack of interest among fishermen in owning a catamaran and most opted for an FRP instead. This was a background trend even pre-tsunami, especially in the nineties with many catamaran fishers switching over to FRPs popularly attributed the competition from the trawlers (Banerjee, 2005). In fact, one study reveals that in

Nagapattinam alone, FRP boats saw a 2.18 times increase (in number) along with upgradation in capacity (engine capacity from 6-7 hp to 11 hp) while catamarans had a 55 % decline. It is also felt that actual numbers of craft are definitely more than the official figures.

Comparing the number of crafts during post-tsunami with pre-tsunami levels is virtually impossible as many of the boats during pre-tsunami period were not registered and it is not known if all of the boats have been registered during post-tsunami. In the case of nets, another study reveals that there is no significant change in the average number and weight of nets being used post-tsunami. The same study also mentions that there is a significant increase in the mesh size of nets being used. There are also reports of the increase in the use of destructive fishing gears such as mini seine nets (*surukuvalai*) and dragnets during post-tsunami. However, the extent of this is not known (Bhalla, 2006). In the case of hook and line fishing, the average numbers of fishers during pre- and post-tsunami remains the same, but there is a significant increase in the average length of the line used. The number and capacities of the engines have also both increased significantly with shift of the brands being used (Bhalla, 2006).

In the case of crew size, the earlier assumption was that the increase in number of boats would create a shortage of crew. The study by Green Coast shows that this is not the case and that both the average crew size as well as number of active fishers have increased during post-tsunami (Bhalla, 2006). Though there has been an increase in the combined total number of craft in the traditional sector, it is not significantly higher than the pre-tsunami level (Bhalla, 2006). However, when seen in the light of capacity of engine and nature of craft (shift towards FRP boats), the changes in numbers could be significant with implications for catch effort and fisheries. The number of craft in the non-mechanized sector (*vallam* and catamaran) has increased, but not alarmingly. Still some feel that the problem now lies with over-capacity and overfishing within

the non-mechanised sector (as opposed to the earlier situation of the enemy being trawlers) (Salagrama, 2006). However, when one looks at the number of boats engaged in fishing, it gives a different picture as not all of them are being used in fishing. There have been many reasons attributed to this situation, the main ones being the non-availability of crew for the increased number of craft and the change in owner-crew relations. Thus, in some cases the number of fishing days per boat had reduced (Salagrama, 2006). The other reasons have been that the quality of boats was poor and they had to be frequently landed for repairs. Some also felt that this could be due to fishing operations becoming unviable (Salagrama, 2006). Another important point to note is that despite the average increase in engine capacity, the fishing range and grounds of these boats still remain the same (Bhalla, 2006). It is clear from this that increased fleet size, crew size (number of active fishers) and engine capacities may not have necessarily increased the catch effort in the same direct proportion but may have increased nonetheless.

As a result of the damage and loss of craft and gear, for at least three months there wasn't any fishing in the traditional sector and up to seven months in the mechanized sector in severely affected areas. The various factors that influenced the resumption of fishing were: lack of craft, lack of suitable engines and gear, waiting for Government policy on compensation, waiting for restoration of rehabilitation to pre-tsunami numbers, poor quality of boats and frequent repairs, non-provision of correct nets, unable to adapt to gear /craft, *etc.* (Salagrama, 2006). The perception of the respondents on the adequacy of mitigation measures is presented in Table 4.

More than ninety percent of the respondents in both the study areas were satisfied with the adequacy of mitigation measures such as supply/ replacement of fishing devices, repair of fishing devices, technological assistance through public/ private/ NGO sectors, credit facilities and health and hygiene. Nearly two-thirds of the respondents

Table 4. Perceived adequacy of mitigation measures

Mitigation measures	Cuddalore District (n=42)				Nagapattinam District (n=40)			
	Satisfied		Not satisfied		Satisfied		Not satisfied	
	No.	%	No.	%	No.	%	No.	%
Supply/ replacement of fishing devices	42	100.00	0	0.00	39	97.50	1	2.50
Repair of fishing devices	42	100.00	0	0.00	40	100.00	0	0.00
Restoration of infrastructure facilities	15	35.71	27	64.29	28	70.00	12	30.00
Technological assistance through public/ private/ NGO sectors	42	100.00	0	0.00	37	92.50	3	7.50
Credit facilities	42	100.00	0	0.00	37	92.50	3	7.50
Environmental- construction of seawall and planting of mangroves <i>etc.</i>	12	28.57	30	71.43	15	37.50	25	62.50
Health and hygiene	42	100.00	0	0.00	38	95.00	2	5.00

in Cuddalore district expressed dissatisfaction with the mitigation measures such as restoration of infrastructure facilities and environmental protection *viz.*, construction of seawall and planting of mangroves *etc.* In the Nagapattinam district, 30% and 62.50%, respectively, of the respondents expressed dissatisfaction with the mitigation measures such as restoration of infrastructure facilities and environmental protection *viz.*, construction of seawall, planting of mangroves *etc.*

The general constraints as reported by the respondents are presented in Table 5.

Table 5. General constraints

Constraints	Cuddalore District (n = 42)		Nagapattinam District (n = 40)	
	No.	Percentage	No.	Percentage
Increasing operational expenditure, especially the fuel prices	28	66.67	31	77.50
Inadequate fuel subsidy	26	61.90	29	72.50
Shortage of crew	14	33.33	22	55.00
Poor quality of the FRP crafts hurriedly fabricated and issued after tsunami	13	30.95	20	50.00
Diminishing catches and competition for limited resources	12	28.57	18	45.00
Inadequacy of governmental schemes/ extension programmes	8	19.05	12	30.00
Indebtedness/ lack of access to institutional finance	8	19.05	8	20.00
Fluctuations in returns	8	19.05	10	25.00
Frequent loss/ damage of fishing gears	6	14.29	6	15.00
Depleting resources due to ring seine operations	6	14.29	-	-
Double trawling (Rettai madi) being operated by mechanized boats	4	9.52	6	15.00
Lack of alternate livelihood options during lean season	2	4.76	2	5.00
Scarcity of feed for hook and line fishing	2	4.76	-	-
Threat from Sri Lankan Navy	-	-	30	75.00

Increasing operational expenditure, especially the fuel prices, inadequate fuel subsidy, labour shortage, poor quality of the FRP crafts hurriedly fabricated and issued after Tsunami, diminishing catches and competition for limited resources were reported as significant constraints by majority of the respondents in both the study areas. The motorized craft operators get only 150 l of fuel at the subsidized rates of Rs. 10/- per litre with a ration of 10 litres per day for 15 days. In Nagapattinam, 75 % of the fishermen respondents reported that the threat from the Sri Lankan Navy as a major constraint for fishing operations. The other constraints reported were; inadequacy of governmental schemes/ extension programmes, indebtedness/ lack of access to institutional finance, fluctuations in returns, frequent loss/ damage of fishing gears, depleting resources due to ringseine operations, double trawling (Rettai madi) being operated by mechanized boats, lack of alternate livelihood options during lean season and scarcity of feed for hooks and line fishing.

Some studies report that the main changes are unpredictability of winds, changes in currents, rise in water

level at shore and appearance of new species such as white fish (after 20 years) (Benchila and Prabhu, 2005). A majority of the fishermen reported a decrease in the fish catch and attributed this to the use of surkuvalai and the tsunami (Bhalla, 2006). The other changes perceived were; erosion of beaches, changes in sea bed, inability to predict weather patterns, inability to predict fish aggregation, inability to gauge safety, poor catches and changes in fishing grounds.

The needs as perceived by the respondents were better prices for the catches, barriers such as seawall / mangrove plantations, ban on ringseine operation, supply of life saving

equipments, permanent solution for the problem from Sri Lankan Navy, minimum support price for their catches, and waiver of loans. Post-tsunami, the view of majority of the stakeholders has been in favour of natural barriers such as mangroves and vegetation in preference to concrete or stone structures. The stagnation of fish production in the Tsunami affected areas especially in Tamil Nadu coupled with increase in craft and gear over the last two decades, warrants the need for a combination of management measures, precautionary approaches and livelihood strategies towards restoration and rehabilitation of fisheries in the tsunami affected districts. There is a need to conduct regular long-term monitoring and assessments of craft composition, use, ranges, fishing grounds, engine capacities, trips per month along with net use, targeted species, catch and income in all affected areas. Survey of the extent of use of destructive fishing gears such as mini seine nets needs to be taken up.

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