



Socio-economics and livelihood status of coastal fishers in the Puducherry Union Territory of India - An exploratory study

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ABSTRACT

Knowledge on the socio-economics and livelihood status of fishers is important in view of stagnating capture fisheries production in recent years and to plan suitable additional livelihood interventions. A study undertaken among the coastal fishers (n=145) of Puducherry and Karaikal Districts of Puducherry Union Territory along the south-east coast of India in 2018-19, indicated that while fishing was the full time occupation for Karaikal fishers, about 56% of the coastal inland fishers of Puducherry District realised their income from non-fisheries occupations due to insufficient employment and income in fisheries. The fishers' mean livelihood score was found to be 70% which indicated that they need supplementary activities for employment and income generation. Therefore, Department of Fisheries (DoF) may plan a two-pronged strategy comprising natural resource restoration measures such as re-stocking and stock enhancement involving habitat protection. Similarly the DoF may initiate capacity enhancement programme on culture based fisheries like cage and pen farming in the open waters with the technical support of research institutions and homestead based additional income generating activities with the support of non-governmental organisations to enhance the livelihood security of fishers. It is right time for the DoF to propose plans for both resource conservation and culture fisheries based livelihood security programmes under the newly launched Prime Minister's Fisheries Development Scheme (Pradhan Mantri Matsya Sampada Yojana-PMMSY) of Govt. of India to ensure the livelihood security of fishers.

Keywords: Cage and pen farming, Coastal fishers, Livelihood security, PMMSY, Stock enhancement

Introduction

Fishing is the way of life and provides livelihood for about 14.5 million fisherfolk in India (Shyam *et al.*, 2013). Fishing contributes about 4.5 million t of fish, which is 40% of the total fish production. However, across the globe the capture fisheries production has been stagnant since eighties (FAO, 2020). The maximum sustainable yield (MSY) of the fish stocks from the Indian EEZ was assessed to be 3.93 million t (Annon., 2000). Though maximum exploitation has been reported, yields from these stocks are yet to attain their MSY (CMFRI, 2018). Fishing occupation *per se* has transformed from the subsistence-oriented traditional fishing into a market oriented trade with the advancement of technology, new gears and crafts. However, advent of mechanised crafts and gears and unsustainable fishing practices have negatively affected the renewable nature of fishery resources, that made the capture fisheries production close to the maximum ecosystem productivity (NRC, 2006). About 80% of the targeted fishery resources are overexploited and hence, the sustainability of fishing is under threat (FAO, 2009). This precarious scenario has not only altered the socio-economic fabric of fishers but also caused severe strain on their occupational and livelihood status. Fisherfolk mostly live on the seashore, a

relatively vulnerable ecosystem prone to natural disasters and climatic perturbations (Barange *et al.*, 2018). Studies indicated that fisherfolk mostly live on a day to day basis, depend on traders and money lenders and spend their lives managing the burden of debts. This cause an economic condition of 'cyclical poverty' leading to poverty, low income, poor health and malnutrition (Deitrich and Nayak, 2002).

The 'fishing famine' due to the unsustainable fishing practices and peculiar life style of fishers make their occupation unsustainable and livelihoods under severe strain. Livelihood is a multidimensional perspective which includes assets (natural, social, human, physical and financial), capacities and activities needed for the people to make a decent living (DFID, 1999; FAO, 2005; He *et al.*, 2014). Livelihood assets, structural and institutional changes are two important factors influencing sustainable livelihoods (Ashley and Carney, 1999; Frost, 2007). Fisheries sector incorporates diverse range of livelihood activities, from production and processing to marketing and ancillary functions, but many people engaged in these activities remain unrecognised as fish workers (Salagrama, 2006). Nevertheless, Rahman *et al.* (2012) reported that the fishers' household income was limited and fish resources were decreasing and consequently

the supplementary income from other than fisheries assumes great importance. Therefore, information and knowledge on socio-economic conditions of fishers and fishing communities are very important for planning and implementation of fisheries management programmes (Devi *et al.*, 2012; 2014). In this background, the present study was undertaken to study the socio-economic and livelihood status of fishers from selected districts of the Puducherry Union Territory (UT) along the south-east coast of India.

Materials and methods

The present study was conducted during 2018-19 among the coastal inland and marine fishers of Puducherry and Karaikal districts of Puducherry UT (Fig. 1). A proportionate random sample of 145 active fisher families which included 85 in Puducherry and 60 fisher families in Karaikal districts representing major fishing villages was chosen to collect the primary data. Earlier studies measured rural livelihood security status of the fishers

based on literacy, healthcare and income profile (Shyam *et al.*, 2013) and by studying composite socio-economic attributes (Hossain *et al.*, 2015). In this study, eighteen attributes reflecting the livelihood assets, activities and capacities were selected based on the attribute relevancy score given by a group of subject matter specialists for assessing the livelihood status of fishers (Table 1) in tune with the Sustainable Livelihood Approach advocated by earlier studies (DFID, 1999; FAO, 2005; He *et al.*, 2013). Appropriate operationalisation and scoring procedures were worked out for all the variables following standard methodology. The scores of all the eighteen variables were summed to arrive at a total score and the ratio of individual respondent's score to the possible total score gives the individual's livelihood score. The data were collected through personal interview with the head of the household using a pre-tested interview schedule. Descriptive statistics was used to consolidate and quantify the primary data and the non-parametric Mann-Whitney U test was employed to compare the livelihood levels of fishers of Puducherry and Karaikal districts.

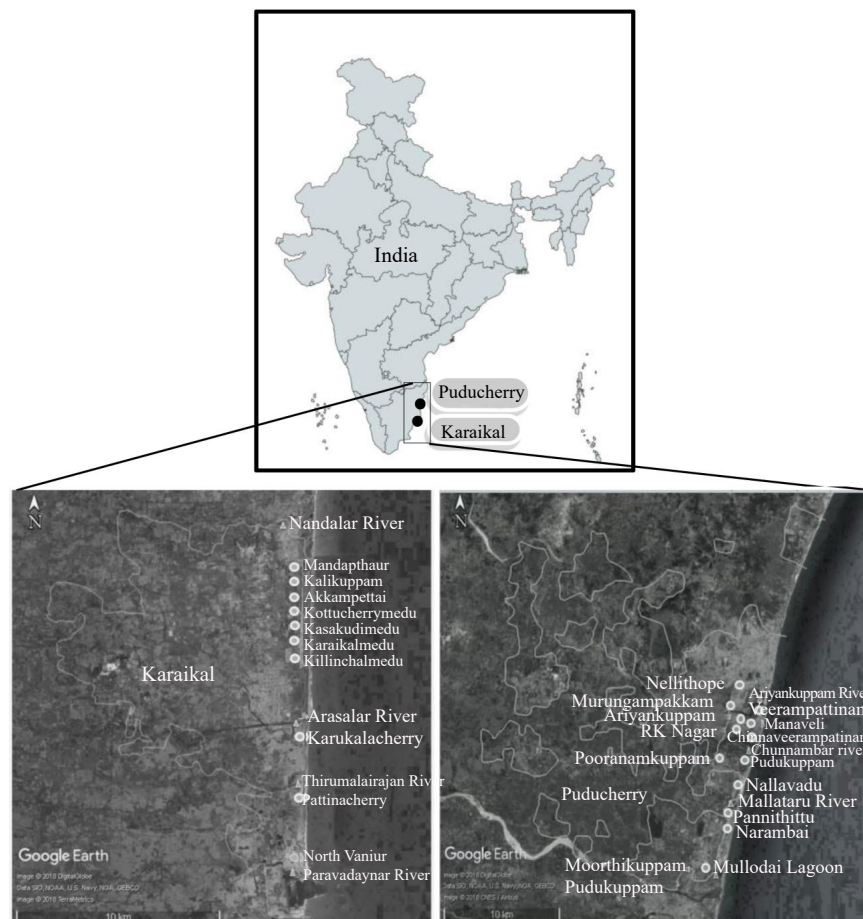


Fig.1. The study area (Fisher villages of Puducherry and Karaikal regions)

Table 1. Socio-economic status of the fishers of Puducherry Union Territory

Sl. No	Attribute	% of fishers in Puducherry (n=90)	% of fishers in Karaikal (n=60)
1	Age		
	Up to 40 years	37.00	61.00
	41-60 years	35.00	32.00
	Above 60 years	28.00	7.00
2	Education		
	Primary literate	18.00	13.00
	Middle school	27.00	28.00
	High school	49.00	53.00
	Graduation and above	6.00	6.00
3	Educational assistance to fisher children		
	Primary	9.00	7.00
	Secondary	91.00	93.00
4	Family type		
	Nuclear	69.00	60.00
	Joint	31.00	40.00
	Family size - upto 4	66.00	60.00
	Family size - > 4	34.00	40.00
5	Family earning capacity		
	Single	36.00	63.00
	Double	64.00	37.00
6	House type		
	Thatched	4.00	0.00
	Tiled/Asbestos	36.00	32.00
	Concrete	60.00	68.00
7	Fishing experience		
	Up to 20 years	55	72
	21 and more years	45	28
8	Occupation		
	Fishing only	38.00	75.00
	Fishing + Fish trade	31.00	12.00
	Fishing + Business	31.00	13.00
9	Social participation		
	Not part	6.00	0.00
	Yes - Member	82.00	68.00
	Yes- Office bearer	12.00	32.00
10	Training attended		
	Attended	22.00	22.00
	Not attended	78.00	78.00
11	Contact with Fisheries Department		
	Fortnightly	2.00	8.00
	Monthly	28.00	64.00
	Occasionally	33.00	27.00
	Rare	37.00	1.00
12	Mass media exposure		
	Newspaper		
	Daily	19.00	14.00
	Once in two days	22.00	49.00
	Weekly	59.00	37.00
	Radio		
	Daily	19.00	4.00
	Once in two days	39.00	68.00
	Weekly	42.00	28.00
	TV		
	Daily	8.00	2.00
	Once in two days	8.00	3.00
	Weekly	84.00	95.00

Contd.....

Sl. No	Attribute	% of fishers in Puducherry (n=90)	% of fishers in Karaikal (n=60)
13	Mobile phone and usage		
	Type-simple	95.00	88.00
	Type-smart	5.00	12.00
	Information sharing-Yes	12.00	2.00
	Information sharing - No	88.00	98.00
14	Access to Social Media		
	Yes	9.00	7.00
	No	91.00	93.00
15	Innovativeness		
	Trying new ideas	35.00	45.00
	Not trying new ideas	65.00	55.00
16	Credit behaviour		
	Not availed loan	41.00	50.00
	Availed loan	59.00	50.00
	Availed loan - Institutional	2.00	20.00
	Availed loan - Moneylender	39.00	20.00
	Availed loan - Fish traders	14.00	10.00
	Availed loan - Friends/Relatives	4.00	0.00
17	Average monthly income (₹)		
	Coastal inland fisher - season	20353	21692
	Coastal inland fisher - offseason	10422	10500
	Marine fisher- season	25320	24022
	Marine fisher - offseason	12960	12402
18	Credit assistance to fishers	93.00	98.00
19	Insurance coverage to fishers	85.00	52.00
20	Medical facilities at the fisher villages	92.00	78.00

Results and discussion

Socio-economic status of fishers

Socio-economic characteristics of the respondent fisherfolk are presented in the Table 1. Age is an important factor in determining the physical capacity of the individual and majority of the respondents in Karaikal (61%) and more than one-third of Puducherry (37%) respondent fishers were of less than 40 years age. Almost one third of both Karaikal (32%) and Puducherry (35%) fishers were in the age category of 41-60 years. This indicates that the fishers were in the active age group and they can be effectively trained in scientific fisheries management practices. Previous studies on fisherfolk reported that the active fishers were in the age group of 35-50 years (Charles *et al.*, 2009; Joshua 2009; Shyam *et al.*, 2013, 2017; Bappa *et al.*, 2014; Hossain *et al.*, 2015; Ghosh *et al.*, 2015; Mridula *et al.*, 2015).

The fishing communities often face educational disadvantage due to geographical and social marginalisation (FAO, 2006), however, half of the respondents in Puducherry (49%) and Karaikal (53%) were educated upto high school level. Vichare (2010) reported that 45% of fishers in Maharashtra state acquired secondary education. Their age and educational status

indicate that they were capable of learning new skill sets to take up fisheries and fisheries related supplementary employment opportunities. Majority of the fisher families in Puducherry (69%) and Karaikal (60%) were of nuclear type and their family sizes were also small with four members or less (66 and 60% respectively). Shyam *et al.* (2016) reported that small family norm (family size of 2-4 members) was most commonly adopted by the fisher households. However, about 30-40% of fisher families lived as joint families which indicated that their family relationships were intact and they help mutually during the needed situations. Nirmale *et al.* (2007) reported that 84% of coastal fisherfolk of Maharashtra had nuclear type of family and Shankar (2010) found out that nearly 57.33% of the fisherfolk had a joint family.

It is interesting to note that majority of Puducherry fisherfolk (64%) had more than one source of income. Majority of the coastal inland fishers shifted their occupation to fish marketing owing to poor catch from the estuarine and coastal river waters. The fisher villages were closer to the Puducherry city which was visited by many Indian and foreign tourists throughout the year and hence the opportunities for employment or avocation were relatively higher than Karaikal District. However, majority of the fishers of Karaikal (75%) were full-time

fishers and depend on fishing for their livelihood. This finding indicates that unlike in agricultural sector where the younger generation relatively shifted out of their parental occupation, the fisher youths continue to show their interest in their traditional occupation. Shyam *et al.* (2017) reported that though the dependency on fisheries is higher among fisherfolk, the other sources also provided substantial support in order to compensate lean season income in fisheries.

Further, 60 and 68% of fishers in Puducherry and Karaikal respectively had concrete houses and possessed all the essential household items including high-end entertainment gadgets. However, Mirudula *et al.* (2015) reported that 68% of fishers in Bangladesh had mud-made (kacha) houses which indicated their poor economic status. About three fourth of Karaikal (72%) and more than half (55%) of Puducherry respondents had up to 20 years of fishing experience. About 45% of Puducherry fishers had more than 20 years of experience which is in conformity with the age groups of the respondents belonging to both the places. All the Karaikal respondents (100%) and the majority of fishers in Puducherry (82%) were part of traditional fishermen associations known as “fisher panchayats” and this provided them the ‘social standing’ to represent their fishing-related issues with fellow fishers of other villages and to the Government Departments for any assistance. In terms of contact with DoF which is the nodal agency for their welfare, majority of Karaikal respondents (65%) contacted the DoF officials on weekly basis for one or other purpose. However, in case of Puducherry, one third of the respondents had monthly to occasional (28-33%) contacts with fisheries departments and one third of them (37%) had rarely contacted the officials. This may be due to the fact that Karaikal fishers were mostly dependent on fisheries for their livelihood and need to approach DoF for getting permission to go for fishing, availing advisories and for getting assistance through various schemes.

Mass media like newspapers, radio and television are the source of information for the people to understand the day-to-day happenings and information pertaining to the subject of their choice. However, the respondents of Karaikal District read newspapers (48%), listened to radio on alternative days (68%) and viewed television at weekly intervals (95%). In case of Puducherry region, the respondents read newspapers (59%), radio (41%) and television (84%) respectively at weekly intervals. This may be because the fishers who go for fishing in mechanised vessels return to shore only after 4-5 days. Subsequently they take rest rather than watch TV for entertainments. Further, it was noted that with the advent of mobile phones, the other mass media channels had lost their importance.

Most of them had smart mobile phones (95 and 88%) to communicate and share information. Therefore, the fisheries department needs to have a database of mobile numbers of all fishers to communicate any information, preferably in the form of voice calls rather than sending short messages which is more effective. It may be noted that the concept of community radios needs to be re-invoked to communicate any information or advisory to the fishers. Majority of fishers in both the regions (65 and 55%) reported that they were not aware of any new practices in fishing in terms of gear, craft, timings and method of fishing. Estuarine fishers used cast nets and gillnets for fishing, whereas the marine fishers used gillnets, trawl nets (*izhuva valai*) and purse seine nets (*surukku valai*) as gears for fishing. The type of fishing craft used are in tune with the abundance of different species of fishes available in the water body.

Around half of the respondents (59 in Puducherry and 50% in Karaikal) availed loans to meet their operational expenditure, but the remaining half of the fisher respondents expressed that they did not borrow from others to manage their expenses. While 41% of Puducherry fishers availed loans from non-institutional sources like money lenders, the fishers of Karaikal region availed loans both from the institutional sources like banks and non-institutional sources like money lenders. Surprisingly, debt-trapping of fishers by fish traders, by giving them loan and collecting back their catch in place of the loan given was not reported in both the regions. This is an important finding contrary to the findings of similar studies among the fisherfolk elsewhere (Deitrich and Nayak, 2002; Shyam *et al.*, 2017). The average monthly income earned by the coastal inland fishers during the fishing seasons ranged from ₹20,353 to 21,692/- while the coastal marine fishers earned between ₹24,022 and 25,320/-. Income levels of the respondents were relatively higher than the income levels of fishers elsewhere (Shyam *et al.*, 2017). However, during off seasons their monthly income varied from ₹10,422 to 10,500/-, for the estuarine fishers and ₹12,402 to 12,960/- for marine fishers. During off season their monthly income reduced by 50% in spite of the same effort on fishing. Therefore, they need to be supported with alternative employment and source of income during off season.

It may be noted from Fig. 3 that the fishers spent 10% of their income on their childrens’ education which was found to be insufficient *vis-a-vis* other communities which could be the reason for low percentage of graduates among the fishers. It was reported that the average share of expenditure on higher education out of total household expenditure is 15.3 and 18.4% for rural and urban households who participate in higher education. This

average is higher in the southern states since individuals from these states are more likely to be enrolled in private unaided institutions where fees are higher and are more likely to be pursuing technical education (Chandrasekar *et al.*, 2016). Therefore, it is suggested that the Govt. of Puducherry may take up measures to promote higher learning among the fisher students by evolving a suitable scheme with higher education scholarships. Shyam *et al.* (2013, 2017) reported that food contributed to the primary source of expenditure in the fishers' household accounting for 35% followed by durables (23.8%), personal expenses (16.2%), clothing (6.3%), education (5.3%), medicines (5.0%) and fuel (4.8%) and considerable number (59%) of fishers had no savings. As far as welfare schemes are concerned, the DoF provided financial assistance to marine fishers, a consolidated sum of ₹5500/- per family during the fishing ban period starting from 15th April to 15th June (61 days) for both coastal and marine fishers. The Govt. of Puducherry implemented a central sector scheme for providing accidental insurance to fishers to the tune of ₹50,000 per head in case of loss of life and permanent disabilities and ₹25,000 in case of partial disability. Majority of the Puducherry (85%) and Karaikal

(52%) fisher respondents were covered by the scheme of accidental insurance support by the Government. Most of the fishers in both the regions revealed that (92 in Puducherry and 78% in Karaikal) they had basic medical facilities in their villages.

Livelihood analysis of fishers

Livelihood assessment of fishers given in Table 2 shows that, while the average livelihood score of fishers was 70%, the Puducherry and Karaikal fishers respectively had a mean livelihood score of 67.50 and 72.50%. The Mann Whitney analysis indicated that there is a significant difference in the livelihood levels of Puducherry and Karaikal fishers ($p \leq 0.01$) wherein the livelihood level of Puducherry fishers was in the range of low (33%) to medium (54%), while it was medium (58%) to high (32%) in case of Karaikal fishers (Fig. 2). Though the livelihood status of respondent fishers were relatively better *vis-a-vis* the livelihood status of the fishers of other areas (Bappa *et al.*, 2014; Ghosh *et al.*, 2015; Mridula *et al.*, 2015; Shyam *et al.*, 2017), it is unsustainable considering the depleting natural resources, unsustainable fishing practices and lack of supplementary skill sets. Therefore, the fishers needed supplementary livelihood activities in terms of culture based production systems and skill capacities for employment and income generation to ensure their livelihood sustainability. It is reported that Culture Based Fisheries (CBF) development in the open waters through adoption of customised cost effective cages and pens would benefit to enhance fish production, increase income of the fisherfolk and contribute significantly to the livelihoods of coastal communities (De Silva *et al.*, 2006; Pushpalatha and Chandrasoma, 2009; Chandrasoma *et al.*, 2015; De Silva, 2016; Liyanage and Pushpalatha, 2018). Farming in open brackishwater resources using customised cages may contribute substantially towards employment creation, fish production, livelihood security,

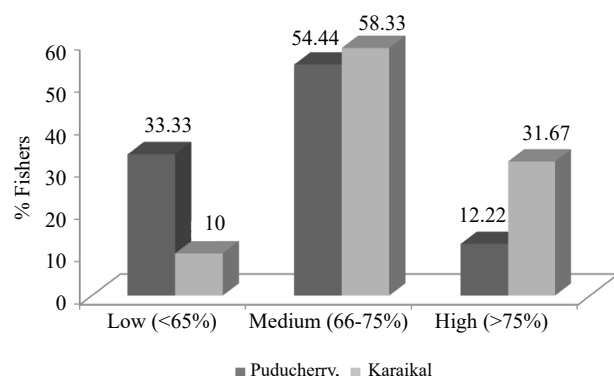


Fig. 2. Livelihood levels of fishers

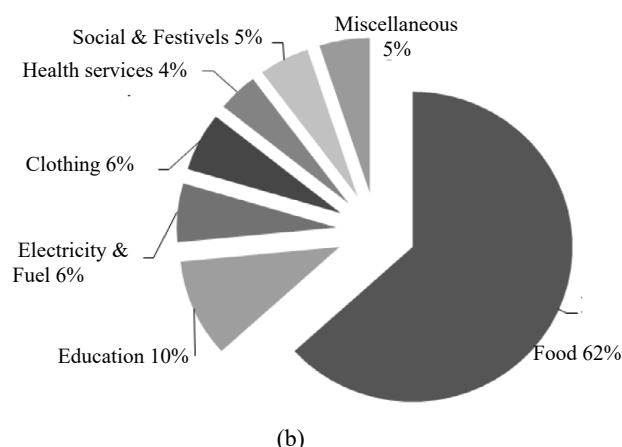
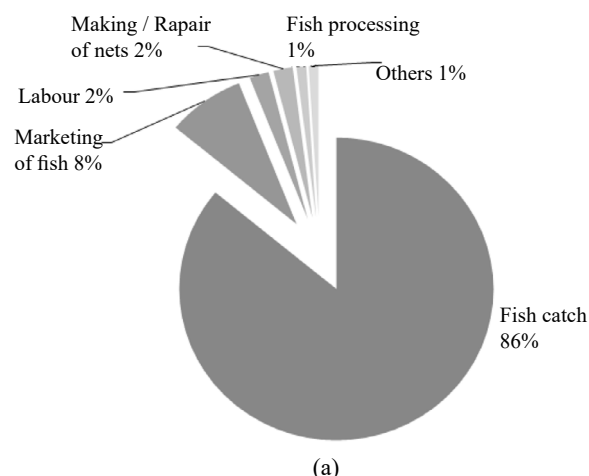


Fig. 3. Sources of income (a) and (b) expenditure patterns of fisher folk (%)

Table 2. Livelihood assessment of coastal fishers of Puducherry UT

	Livelihood attributes	% of fishers Puducherry (n=85)	% of fishers Karaikal (n=60)
Fishery resources availability (Natural asset)	Good	0.00	0.00
	Moderate	38.82	55.00
	Poor	61.18	45.00
Craft and gear ownership (Physical asset)	Own	48.24	53.33
	Hired	51.76	46.67
Craft and gear type (Physical asset)	Mechanised	15.29	48.33
	Traditional	84.71	51.67
Age (Human asset)	Up to 40	20.00	43.33
	41-60	51.76	50.00
	Above 60	28.24	6.67
Family size (Human asset)	Up to 4	65.88	60.00
	Above 4	34.12	40.00
Family educational status (Human asset)	Graduate and above	5.88	5.00
	others	94.12	95.00
No. of earning members (Financial asset)	More than one (>1)	63.53	36.67
	One (1)	36.47	63.33
Type of house (Physical asset)	Kuccha	3.53	0.00
	Tiled	36.47	31.67
	Concrete	60.00	68.33
Occupational status (Financial asset)	Additional occupation	61.18	25.00
	Only fishing	38.82	75.00
No. of days of employment in fishing (Financial asset)	180 days and more	100.00	100.00
	91-180 days	0.00	0.00
	Up to 90 days	0.00	0.00
Access to Dept. schemes for welfare (Social asset)	Better access	92.94	98.33
	Poor access	7.06	1.67
Access to institutional credit (Social asset)	Better access	23.53	20.00
	Poor access	76.47	80.00
Access to insurance coverage (Social asset)	Better access	84.71	51.67
	Poor access	15.29	48.33
Access to health care - Medical facilities locally (Social asset)	Better access	91.76	78.33
	Poor access	8.24	21.67
Average monthly income (Financial asset)	< ₹15000	45.88	45.00
	₹15001- 25,000	54.12	55.00
	> ₹25001	0.00	0.00
Personal capacity - Possession of additional skills (Human asset)	Have additional skill sets	41.18	35.00
	Only fishing	58.82	65.00
Monthly savings in the form of any investments (Income-expenditure - Financial asset)	Moderate saving	35.29	35.00
	poor saving	64.71	65.00
Social participation (Social asset)	Not a member	06.00	0.00
	Member	94.00	100.00
Mean livelihood score		27.43 ± 2.55	29.13 ± 2.36
% of people whose livelihood levels are below the mean score		39%	40%
Overall livelihood score		28.14 ± 2.61 (70%)	
Average livelihood in %		67.50	72.50

Mann-Whitney U test of significance score is 3438** ($p \leq 0.01$). Significant at 1% level indicates that Karaikal (mean rank 87.80) has better livelihood status than their Puducherry (mean rank 62.55) counterparts.

doubling the fisher's income and blue economy vision of the Govt. of India (Sheriff *et al.*, 2008; Krishna, *et al.*, 2014; Liyanage *et al.*, 2018; CIBA, 2019). It is important that the Department of Fisheries (DoF) may initiate efforts to clean-up the coastal water bodies in Puducherry region and facilitate the fishers to take up culture based fisheries to enhance their income and livelihood status. In addition to alternative livelihoods, the DoF may take up fish stock improvement in the natural waters through sea ranching, effectively implement the code of responsible fisheries by forming co-management committees in the fishing villages, to enhance the natural resources. Experience has proved that rebuilding overfished stocks can produce higher yields as well as substantial social, economic and ecological benefits (FAO, 2018).

It may be noted that the respondents expressed that fishery resources in the natural waters were poor (61%) in Puducherry District and poor to moderate in case of Karaikal (100%). The fisher respondents reported that their catches were diminishing gradually over the years because of depletion of fishery resources irrespective of the regions. Further, urgent efforts are needed to motivate the fishers to adopt sustainable fishing gears and methods. Mohammad Serajuddin *et al.* (2018) reported that the ICAR-Central Marine Fisheries Research Institute (ICAR-CMFRI), India has been undertaking marine fish stock assessment in India and recorded a total of 709 species which is lower than 730 species recorded in 2015 in the landings showing an alarming situation on exploitation. The situation demands restoration measures such as re-stocking, stock enhancement involving habitat protection and sea ranching.

Around half of the respondents hired their crafts and gear which mean that one third of their income might go for the hiring charges. At the same time, their access to institutional credit was also poor. This necessitates that they need to be supported with institutional credit for the purchase of suitable craft and gear. Inability to provide collateral security to banks was the reason reported for their poor access to avail institutional credit. Further, it was also reported that the respondents did not possess any other skills like culture based fisheries. Therefore, the DoF may approach the Research institutions under the Indian Council of Agricultural Research (ICAR), to organise skill development programmes for the fishers on culture based fisheries, demonstrate nursery rearing of fishes and cage aquaculture in open waters. The DoF, Puducherry need to plan livelihood security programmes for the fishers under the newly launched Prime Minister's Fisheries Development Scheme (Pradhan Mantri Matsya Sampada Yojana-PMMSY) which envisages harnessing the fisheries potential with an outlay of ₹20,050 crores

through various measures such as strengthening value chain, measures for doubling the income, employment generation as well as economic and social security for fish farmers, adhering to sustainability principles.

Results of the study revealed that the livelihood status of fishers were at moderate levels and needed additional employment and income generating activities. It is heartening that the active fishers of Puducherry UT are relatively young and receptive to scientific interventions. Therefore, the fishers need to be trained on culture based fisheries like nursery rearing of fishes, cage culture, pen culture of fishes and fattening of crabs in open waters and facilitate to take up culture based fisheries which could provide them additional employment and income. The study showed that their livelihood levels were unsustainable owing to diminishing natural resources, and climate change impacts further made them vulnerable (Barange *et al.*, 2018). Therefore, natural stock restoration measures such as re-stocking, stock enhancement involving habitat protection are to be taken up. Further, efficient implementation of Code of Conduct for the Responsible Fisheries through co-management approach and capacity enhancement of fisherwomen for taking up homestead based additional income generating activities may contribute for their livelihood security.

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