MANAGEMENT ASPECTS OF NAVANTHURAI AND KARAINGAR LAGOON FISHING VILLAGES, NORTHERN SRI LANKA

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Abstract: Navanthurai and Karainagar both are considered as two main fishing villages situated in different Fisheries Inspector divisions in Jaffna lagoon, northern, Sri Lanka. The socio-economic and fishery status of Karainagar and Navanthurai lagoon fishing villages were meagre and comparative studied since those status of both fishing villages are limited in the literature. This study was conducted from February 2022 to May 2022 with an aim of evaluating socioeconomics for the improvement of livelihood of lagoon fishing communities which may lead optimum management of themselves as well as the fisheries. Primary data were gathered using a semi-structured questionnaire from selected 100 fishermen out of 500 through snowball sampling method at both sites. The secondary data were gathered in the Department of Fisheries and Aquatic Resources (DFAR). Analysis of the socio-economic characteristics and fisheries status were done by using IBM SPSS 26 and excel 2013. The outcome of the study revealed that the majority of fishermen in Navanthurai landing were aged 20-30years with ordinary education (44%) and fishers in Karainagar were middle aged group of men and women (31-40years) with the primary education (57%). The monthly income of fishermen was estimated as 77% in Navanthurai and 71% in Karainagar; which came under 20,000 LKR to 50,000 LKR income category. There were 5 types of fishing crafts i.e., stake net, fyke net, gill net, crab net and cast net and 3 types of fishing gears i.e., Non-Mechanized Traditional Boat (NTRB), Mechanized Traditional Boat (MTRB), and Outboard Fiberglass Reinforced Plastic boat (OFRP) in both fishing villages. During the study period, shellfish which belongs to Penaidae family (3%) and family Portunidae (10%); finfish which belongs to families Mugilidae (17%), Gerreidae (13%), Siganidae (16%), Aridae (11%) and Scardae (9%) were identified in both villages. The higher catches per unit of major fishing gears were recorded as 8-14 kg for the stake net in Navanthurai, 5-10 kg for the fyke net in Karainagar during April 1st -May 1st. The market structure was strong in Navanthurai due to the availability of more stakeholders who involved in marketing of fishes than those of Karainagar. The awareness on fisheries sustainability was at moderate level (2.34<mean value<3.66) in both sites. This study provides baseline information on socio-economic status of two fisheries which would facilitate development of an optimum long-term management strategies.

Keywords: Catches per unit; Fishing gears; Fisheries sustainability; Lagoon; Socio-economics

Introduction

Fisheries management nowadays concern human wellbeing, social sustainability along with socio economic aspects of fisher communities. Governments, non-governmental organizations, community-

based organizations, and foundations are striving to develop and manage fisheries that achieve both ecological sustainability and human well-being outcomes (Hobday et al., 2016 cross-ref; Kittinger et al., 2017; Stephenson et al., 2018a cross-ref.). Ellepola G, (2014); Silva et al., (2013) had underpinned the importance of lagoon systems, study of socio economis fs fishing communities and sustainability of fisheries respectively. Miththapala, (2013) also stated that socio-economic factors are indirect drivers of negatively influence management.

The Jaffna lagoon (9° 50' N and 79° 50' E to 9° 20' N and 80° 30' E) is the largest lagoon in Sri Lanka and it provides many services including fishing opportunities to the people in northern Sri Lanka (Ragavan.N, et al., 2021). Karainagar and Navanthurai are fishing villages adjacent to Jaffna lagoon where attention for research on management aspects are scanty. Therefore, it is necessary to improve the management system of that particular fishery area sustainably. Fisheries development used to be more or less understood as social and economic development that should be environmentally sustainable (Moldan.B, et al., 2012). But nowadays normally coastal lagoon service providers or local community people mainly focus on sustainable economic growth while promoting jobs and stronger economies. Awareness is lacking on the value of environment, on the basic principles of sustainability and on attainment of goals. Hence, environment and resources tend to decline in various ways. Therefore, the information of this study would provide the baseline information for optimum management process in relevant fishery. Current study attempted to find out existing fisheries and socio-economic status of two lagoon villages (Navanthurai and Karainagar adjacent to Jaffna lagoon) as well as the existing management strategy and level of awareness on sustainable lagoon fishing, which paves way to manage the resource optimally. Demographic information of fishing community, applicable fishing gears and fishing crafts, fish species caught and catch per unit effort (CPUE), market structure of the two fishing villages as well as level of awareness on fishery sustainability of both fishing villages were collected and compared which may aid to develop an optimum management strategy to enhance the sustainable lagoon fishing.

2. Materials and Methods

Karainagar and Navanthurai fishing villages in Jaffna district, in Northern province, Sri Lanka, were selected as the study area. Many people were involved in fishing along with different types of fishery related activities in aforementioned villages where apparently socio-economic status may differ. The snowball sampling technique was utilized as a non-probability sampling method, to a small subset of the population. 200 fishing families were selected in both villages and conducted the interviews and survey of questionnaires on the socio-economic condition of fishing community.

A questionnaire survey and systematic field interviews and interactive group discussions with fishermen and other stakeholders were performed to gather data in both fishing villages. Primary data were collected by using quantitative methods and qualitative methods. Quantitative data were collected by using semi structured questionnaire through field survey. The questionnaire structure for this study was based on two methods, which were stratified questions and five-point Likert scale type. Qualitative data were collected by using a systematic field interview and an informal discussion with fishermen and fishery society members.

The fish species were identified in the landing sites during the study period; photographs were used to record each species. Tamil names of each species were recorded too. Identification of species was performed using the FAO Species Identification Guide for fishery purposes (Bruin, et al., 1994), Fish Base World Wide Web Database (Forese & pauly, 2019) and internet sources.

The Catch Per Unit Effort (CPUE: size of the fishing net (m²) or net square meter used in a given time period (fishing hours) Catch per unit effort (CPUE) = Total catch / Total amount of effort (Rosario, 2017)) data was recorded for stake net and fyke net (major fishing practices) in ten days with an equal interval during the study period. Fishermen flipped among several gears simultaneously depending on the fish catch available. Most of fishermen relaxed at the landing site while sorting the catch on the boat. So, it was challenging to distinguish the catches from a particular gear (Thivviyan & Jayakody, 2017). Additionally, for the convenience of data collection, the total catch and the amount of unit effort used to harvest the catch were measured from each fisherman with the assistance of members of the fishery society.

Secondary data such as fishing population, fish production and the number of fishing crafts operated in two fishing villages were collected mainly from the Department of Fisheries and Aquatic Resources Development. Some secondary information was gathered from books, journal articles and research reports, related to the study including information from fishery society members.

Data collected from the questionnaires were analysed and evaluated mainly by using Univariate and Bivariate analysis. The Statistical Package for Social Sciences (SPSS 26.0 version) and Microsoft Excel 2010 software were used to simplify the analysis work of this study. Graphs, tables and other statistical tools were used for analytical and interpretation purposes. The table 1 indicated the selected variables for the measurements to survey.

Table 1 variable of measurements

Variable	Measurement
Age	Chronological age in completed year
Education	Grade
Income	SLRs per year and SLRs per month
Nature of the occupation	Full time or Part time
Experience	Number of years engaged in fishery activities
Boat ownership	Yes or no
Fishing gears and crafts	Major fishing gear and craft types used by fishermen
Catch	Total amount of particular species (kg) catches by using particular fishing gear
Unit effort	Net square meter or number of hooks used in a given time period to catch the particular species

Cost components	Major cost items and portion to the total cost
Revenue components	Major revenue items and portion to the total revenue
Amount of harvest	Average harvest (kg) per day
Selling amount	Average selling amount (kg) per day
Price	Price (SLRs)
Awareness of fishery sustainability	Five-point Likert scale

Questionnaire survey on five-point scale was performed to solicit opinions from specialists, the Cronbach's alpha constant (α) was used to calculate the interior consistency of the info obtained. (Bon-Gang, 2018). Univariate analysis was used to evaluate the level of awareness of fishing community on the importance of fishery sustainability. Descriptive statistics (Kenton, 2019) were used to investigate the demographic information (age, education, experience, annual income, nature of the occupation and marital status) of the study and the type of fishing gears & crafts used, fish species with maximum demand throughout the year, total fish production and the marketing system of lagoon fishing village were illustrated by using pie charts and bar charts. The one-way analysis of variance (ANOVA) test (Bon-Gang, 2018) was used to compare the mean values of awareness on several aspects regarding the management of fishery of different stakeholder groups such as fishing craft owners, retailers, auctioneers, dried fish producers, and labourers in the particular fishing community. Post-hoc comparisons test was used to find which pairs of groups or means were significantly different from each other. This analysis was used to test the awareness of the importance of fishery sustainability of the selected fishing community. The catch survey was conducted for fishing activities and CPUE. For that the fish landing sites were observed over a four days per week of study period. Catch of any type of fishing craft per day were randomly selected. The weights of the catch were recorded based on species and gears. For Fyke net and Stake net fishing methods, the unit effort was calculated by multiplying the total fishing hours by the square meter of the net, resulting in net square meter-hours of effort. The size of the net used as a unit of effort to calculate the CPUE of the fyke net and Stake net, the size of the net used to install the stake net or Siraku valai group was used as a unit effort. It was obtained by multiplying the total length of the net by the total width of the net used to install the group.

3. Results and Discussion

Socio-economic status of the fishermen in Navanthurai & Karainagar.

The socio-economic characteristics of sex, age distribution, marital status, educational qualification, experience, nature of the occupation, boat ownership, annual income, monthly income and number of dependents in their family which were collected through the questionnaire survey in Navanthurai and Karainagar fishing village with 100 fishermen are discussed.

Gender distribution - The survey was conducted among the fishermen of which 100% were male in Navanthurai and 72% of male & 28% of female fishermen were in Karainagar (Figure 1 & Figure 2). The women involvement in fishing is significant in Karainagar. They are partially involved in fishing and activities of net repairing, net mending, sorting of catches, selling fishery products, dry fish production, and collection of seashells.
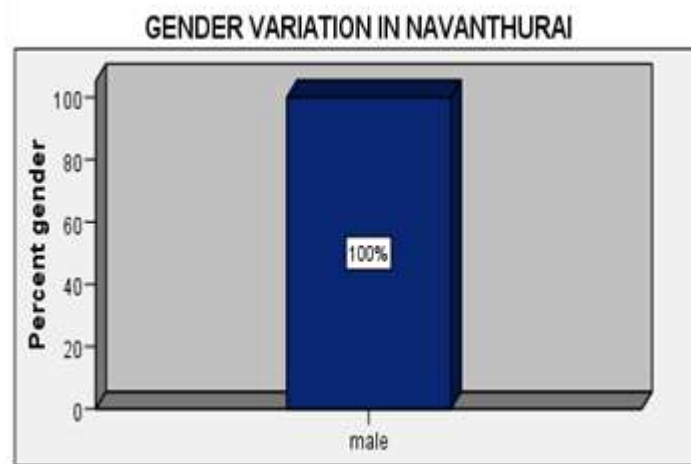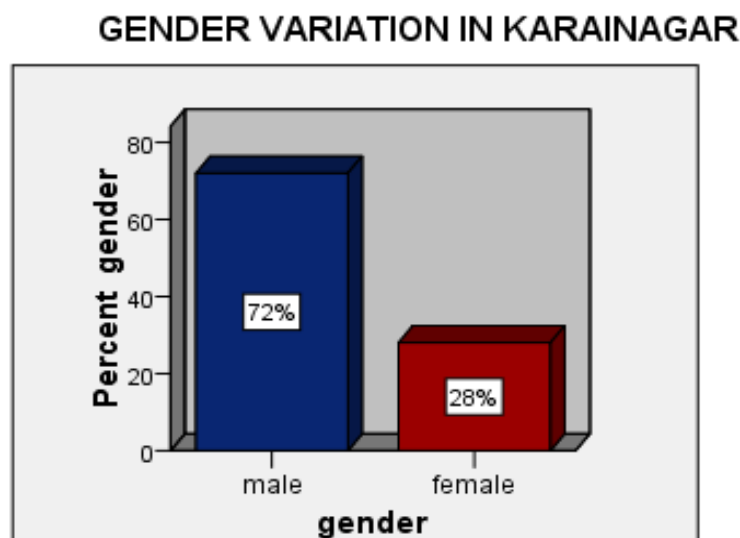

Figure 1: Gender distribution of Fishers in Navanthurai

Figure 2: Gender distribution of Fishers in Karainagar

Age Distribution- The percentage of age distribution of fishermen in the Navanthurai landing site is shown in figure 3. 37% of represent fishermen who are in age 20–30 years group, 23% of respondents belonged to the category of between 31-40 years, 16% and 24% represent fishermen who are in age between 41-50 and above 50 years, respectively. The percentage of the age distribution of fishermen in the Karainagar landing site is shown in figure 4. 19% of represent fishermen who are in age 20–30 years group, 35% of respondents belonged to the category of between 31-40 years, 29% and 17% represent fishermen who are in age between 41-50 and above 50 years respectively. Thus, according to

the sample it can be stated the majority of fishermen who are fishing in Navanthurai landing site are young adult, age between 20-30 and who are fishing in Karainagar landing site are middle age group fishermen, age between 31-40 years.
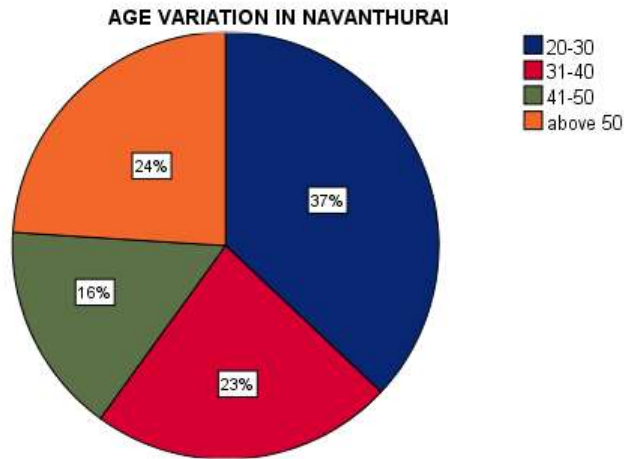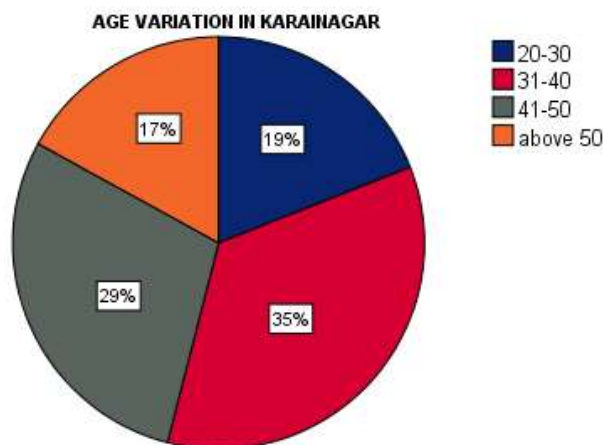
AGE VARIATION IN NAVANTHURAI

- 20-30
- 31-40
- 41-50
- above 50

24%
37%
16%
23%

Figure 3: Age variation of Fishers in Navanthurai

AGE VARIATION IN KARAINAGAR

- 20-30
- 31-40
- 41-50
- above 50

17%
19%
29%
35%

Figure 4: Age variation of Fishers in karainagar

Marital status- According to the survey, 32% and 69% of respondents were married, 68% and 31% of respondents were unmarried in Navanthurai and Karainagar, respectively (Figure 5). Therefore, it revealed that a majority were unmarried active fishermen in Navanthurai; In contrast, majority were married active fishermen in Karainagar.
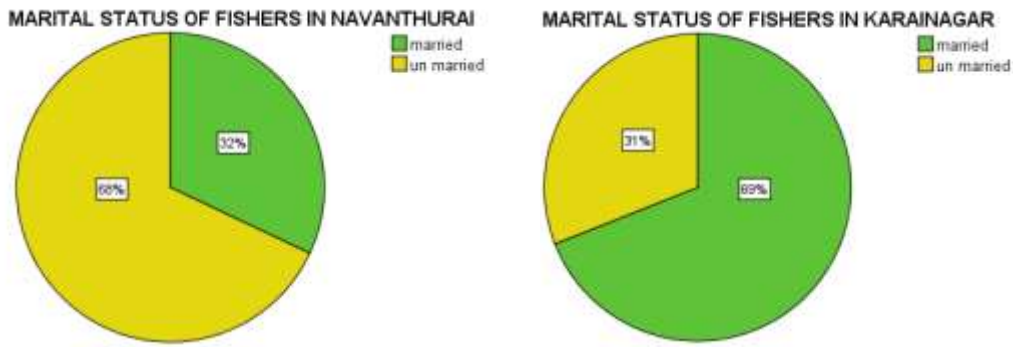
Figure 5: Marital status of Fishers in Navanthurai & Karainagar

Family size variation - The family size of the fishermen was divided into three classes as small, medium & large; with to 0 to 2 dependents; 3 to 5 dependents; 6 to 8 dependents, respectively. Apart from that if the family size was more than 9 dependents it will be a joint family (Das, 2015).

Study found that, most of the fishermen families were medium, in both sites where 44% belonged to Navanthurai and 43% belonged to Karainagar. The small family amount was 28% in Navanthurai & 24% in Karainagar and large family was 28% in Navanthurai & 26% in Karainagar. Specifically, there were some joint families still in the Karainagar region (7%) (Table 2).

Table 2: Family size of Fishers in Navanthurai & Karainagar

Family size	% Respondents Navanthurai	% Respondents Karainagar
0-2	28.0	24.0
3-5	44.0	43.0
6-8	28.0	26.0
Above 9	00.0	7.0

Educational qualifications - The percentage of the educational level of fishermen in the Navanthurai and Karainagar landing site is shown in figure 6. 44% of respondents belonged to the category of ordinary level, 29% of fishermen have received secondary level education, 14% of fishermen have received advanced level education and fishermen who are in primary level represented 13% in the sample in Navanthurai. In Karainagar 57% of fishermen have received primary education, 34% of fishermen have received secondary level education, 8% of fishermen have received ordinary level education and fishermen who had advance level education represented 1% in the sample. Study revealed, most of the people followed their education up to the ordinary level or G.C.E.O/L in Navanthurai. But in Karainagar the literacy level is only up to primary level education. Similar research

was conducted in the Jaffna lagoon fishing villages indicated that fishermen community have low rated literacy level (Vithursha, Sivashanthini, & Gunaalan, 2015;Tharmine, Sivashanthini, & Edrisinghe, 2017)
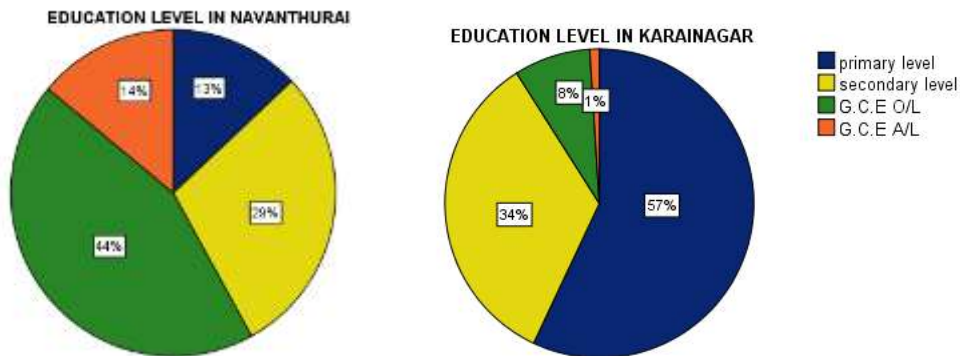

Figure 6: Educational qualification of fishers

Nature of occupation - 62% of respondents belonged to the category of full-time fishing and the rest of 38 % of respondents belonged to the category of part-time fishing in Navanthurai. Among the part time fishermen, 13% of respondents were engaged in painting, 11% of fishermen were masons and 8% & 6% of respondents were labours and performed other occupations (crop farming) respectively (Figure 7). In Karainagar 58% of the respondents belonged to full time fishing category and 42% of respondents partially involved in fishing with painting activities. Among the part time fishermen, 30% of fishermen were engaged in agriculture and 9% & 3% of fishermen were masons and labours (Figure 8). So, the majority were full-time fishermen in both villages.
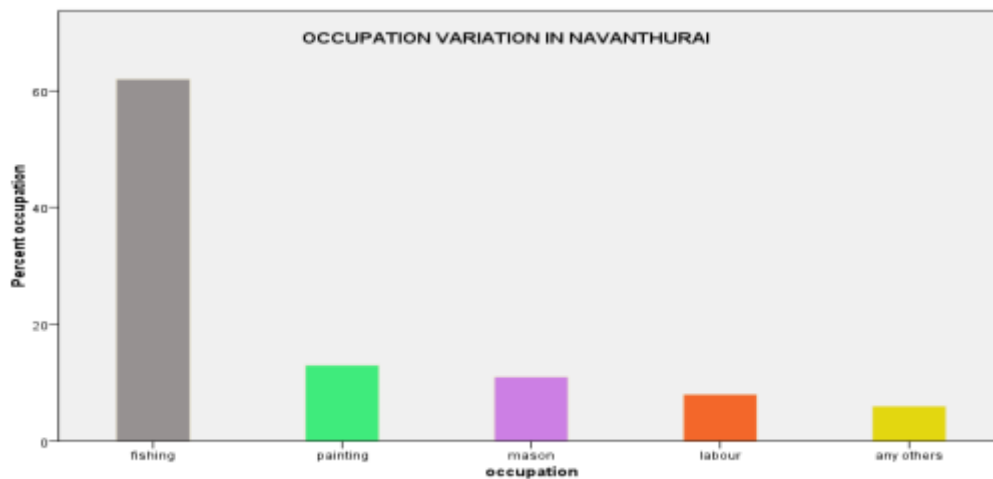

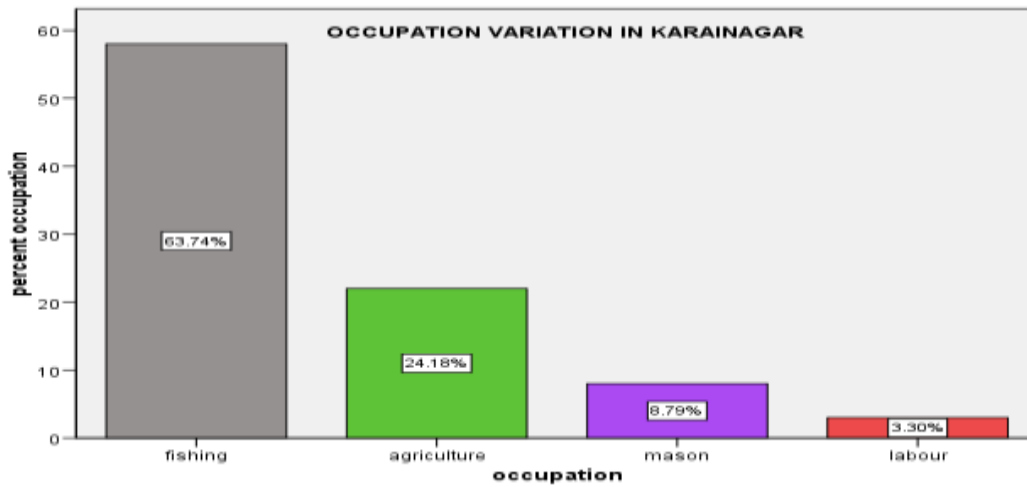*Figure 7: Nature of Occupation in Navanthurai fishers*

Figure 8: Nature of occupation in Karainagar fishers

Experience in Fishing - The percentage of the experience level of fishermen in Navanthurai and Karainagar villages has been shown in figure 9. Nearly 24% of respondents fall in category of 1-5 years of experience, 33% of respondents fall in category of 6-10 years of experience, 19% of respondents fall in category of 11-20 years of experience and 24% of respondents were with 20 years of experience in Navanthurai. In Karainagar, nearly 17% of fishers had 1-5 years' experience, 29% of fishers had 6-10 years, 28% of fishers had 11-20 years experiences and 26% of fishers had above 20 years of experience in fishing. Therefore, it can be concluded the majority of fishermen had 6 to 10 years of working experience in both villages.
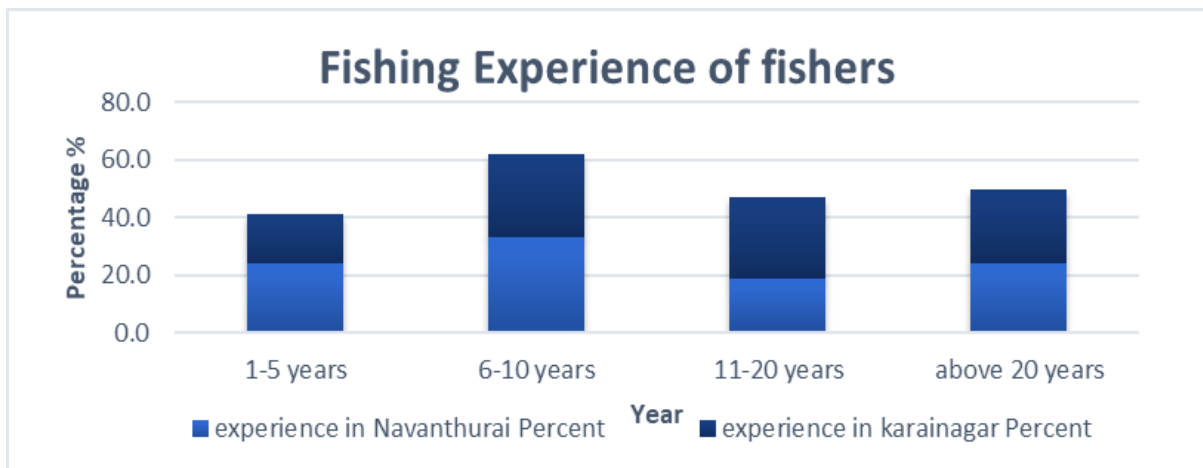

Figure 9: Fishing experience of fishers

Monthly income - Monthly income of fishermen in the survey revealed that 40% of fishermen in Navanthurai and 43% of fishermen in Karainagar earned an income between Rs. 20,000 to Rs. 35,000 monthly. 37% respondents in Navanthurai and 28% respondents in Karainagar had a monthly income in between Rs. 35,000.00 to Rs. 50,000.00; 23% of the sample in Navanthurai and 28% of sample in Karainagar that was below Rs 20,000; 1% of respondents had a monthly income of Rs 50,000 in both villages (Figure 10). So, more than half of fishermen earned more than Rs. 35,000.00 as their monthly income through fishing in both villages. Similar output was found in Jaffna (Ragavan, Sivashanthini, & K. and Sutharshiny, 2017)" and in Karainagar alone (Vithursha, Sivashanthini, & Gunaalan, 2015).
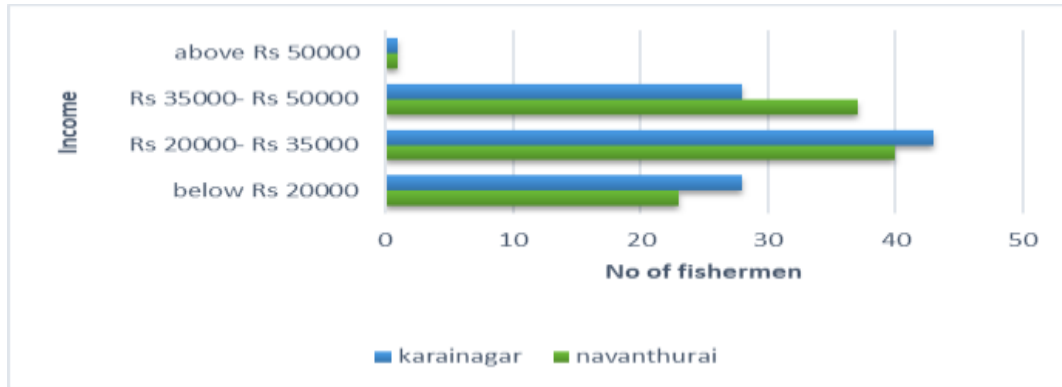
Figure 10: Monthly income of fishermen

Annual income - Average annual income of fishermen varied from Rs 250,000 to Rs 750,000. Selected fishermen were grouped into four categories based on the level of annual income and it was found that 10% of respondents belonged to the category of annual income above Rs. 750,000.00 in both villages, 51% of respondents in Navanthurai, 13% of respondents in Karainagar belonged to the income category in between Rs. 500,000.00 to Rs. 750,000.00, 21% of respondents in Navanthurai, 42% of respondents in Karainagar belonged to income category in between Rs. 250,000.00 to Rs. 500,000.00; 18% and 35% of respondents belonged to the category, below Rs. 250,000.00 in both villages respectively (Figure 11). Therefore, mere half of all fishermen earned more than Rs. 500, 000.00 as their annual income including fishing. Similar results were found for crab fishermen in Navanthurai by Tharmine, Sivashanthini, & Edrisinghe in 2017.
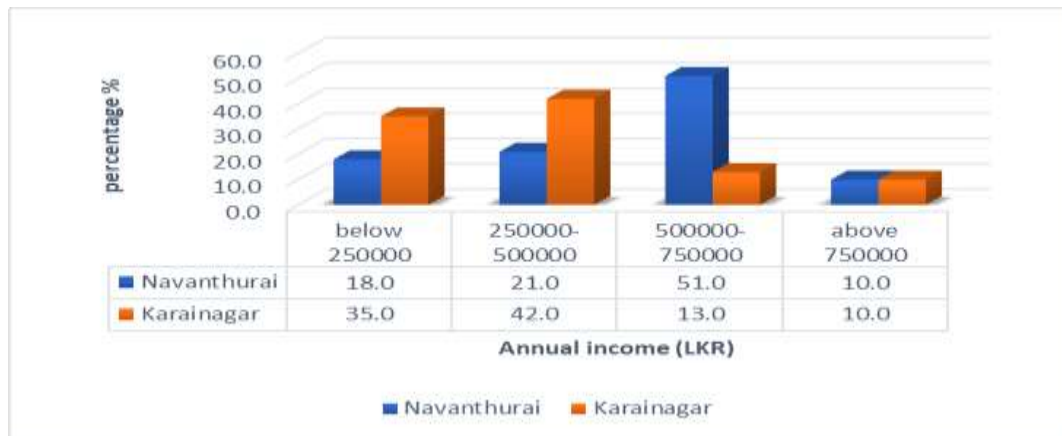

Figure 11: Annual income variation of fishermen in Navanthurai and Karainagar.

Investment and institutions - 15% of fishermen in Navanthurai, 42% of fishermen in Karainagar had their own investments and 85% of fishermen in Navanthurai, 58% of fishermen in Karainagar borrowed money from various institutions (figure 12). It was revealed that fishermen in Navanthurai burrowed money from state or nationalized banks for fishing while in Karainagar that was from co-operative societies and co-operative banks. These cooperative banks were created by the fishing community which facilitated the savings and loans for member fishermen. Other than that, it aids the poverty-stricken people in fishing community.
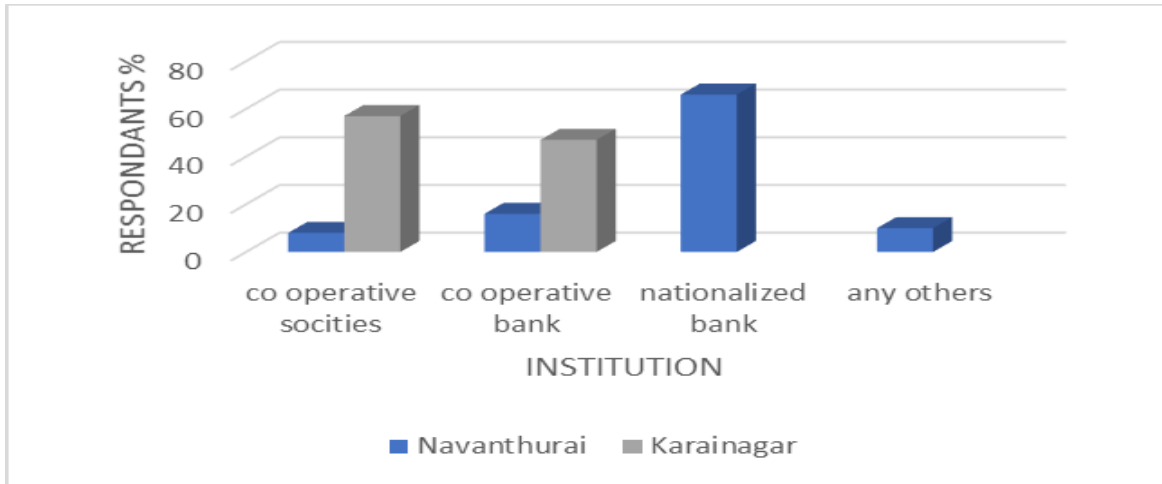
Figure 12: Institutions of borrowed investment for fishing

Housing conditions - The housing conditions of fishermen in Navanthurai fishing village were fully completed with cement brick sheeted roofs (85%). Karainagar fishing Village, houses were built with sand brick & palmyrah / coconuts leaves roofs, semi constructed cement bricks or fully completed cement brick with sheeted roofs (67%, 24% and 7% respectively).

Fisheries status of Navanthurai and Karainagar lagoon fishery

Fishing gears: The types of fishing gears mostly used for fishing activities in the Navanthurai & Karainagar landing site are shown in Figure13.
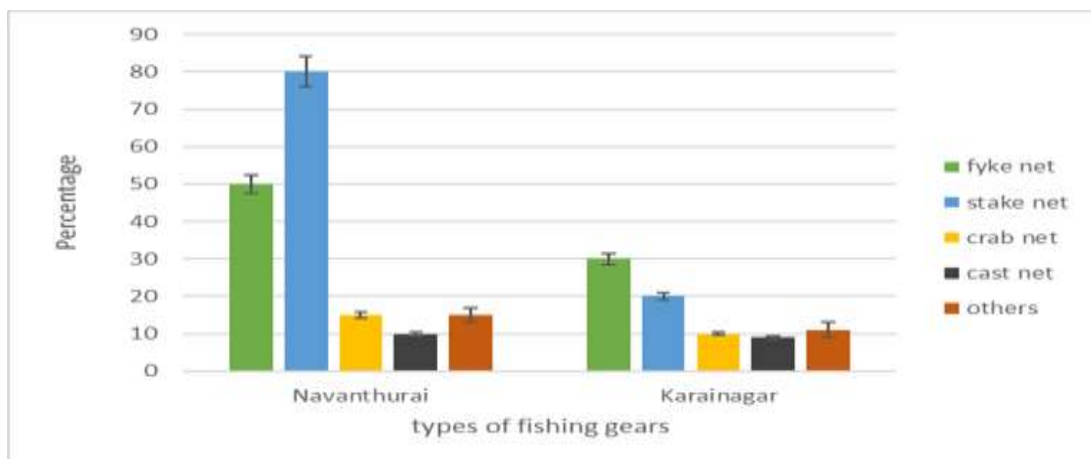

Figure 13: Percent composition of type of fishing gears mostly used for fishing in fishing villages

Fishermen used mainly four types of gears such as fyke net, stake net, crab net and cast net. In Navanthurai stake net (80%) was mostly used and the usage of fyke net, crab net and cast net were 50%, 15% and 10% respectively. In Karainagar Fyke net (30%) was mostly used and the usage of fyke net, crab net and cast net were 20%, 10% and 8.8% respectively. Other gears such as trammel net, gill net, beach seine, hook and line and pole & line were also used in lagoon fishing in both villages, depending on the season and fish availability.

Fishing crafts: The types of fishing crafts mostly used for fishing in Navanthurai & Karainagar villages were shown in Figure 14. It was shown that mainly three types of fishing crafts, i.e., Non-Mechanized

Traditional Boat (NTRB), Mechanized Traditional Boat (MTRB), and Outboard Fiberglass Reinforced Plastic boat (OFRP) were operated in Navanthurai & Karainagar lagoons. Similar results were put forward by Ragavan.N, Dissanayake, & Kuganathan in 2021. Navanthurai fishermen used MTRB (35%) while in Karainagar NTRB was used by 30% of fishermen (Figure 14).
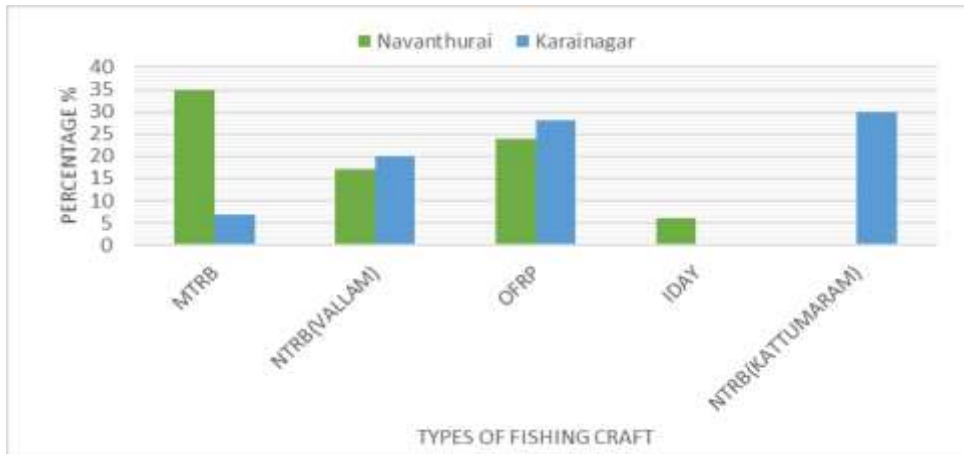

Figure 14: Composition of fishing crafts mostly used for fishing in two fishing villages

 In days boats (IDAY) were used only in Navanthurai and also Kattumaram (NTRC) were used only in Karainagar for fishing. Navanthurai fishing community had high number of fishing crafts than that of Karainagar. 52 Mechanized Traditional crafts were actively operating in Navanthurai but in Karainagar only 8 MTRB were operating for lagoon fishing. MTRP boat could bear a minimum of 2 fishermen. There were 28 operating Outboard Fiber Reinforced Plastic crafts in Navanthurai while   42 were operating in Karainagar. An OFRP boat could bear a minimum of 3 fishermen.   Fishing depth range from 12 – 30 feet while the number of fishing hours were approximately 8 hours.

There were 70 Non-mechanized Traditional crafts (Kattumaram) in the Karainagar.   NTRP boat could bear a minimum of 1 or 2 fishermen and was a day boat which especially used to operate Sirakuvalai and hook and line fishing practices. There were 7 operating Inboard Day crafts in Navanthurai which could bear a minimum of 5 fishermen.

Species Composition - The different types of species recorded at the Karainagar and Navanthurai lagoon landing sites during the study period with their Tamil common name, English common name, scientific name are shown in Table 2.   According to figure 15 there were more than 15 species, Penaidae family recorded high in Karainagar; finfishes belonged to families Mugilidae, Gerreidae, Scaridae and Siganidae were also recorded in Navanthurai. The identified species common name, Tamil name and scientific name were referred and verified using FAO Species Identification Guide for fishery purposes.
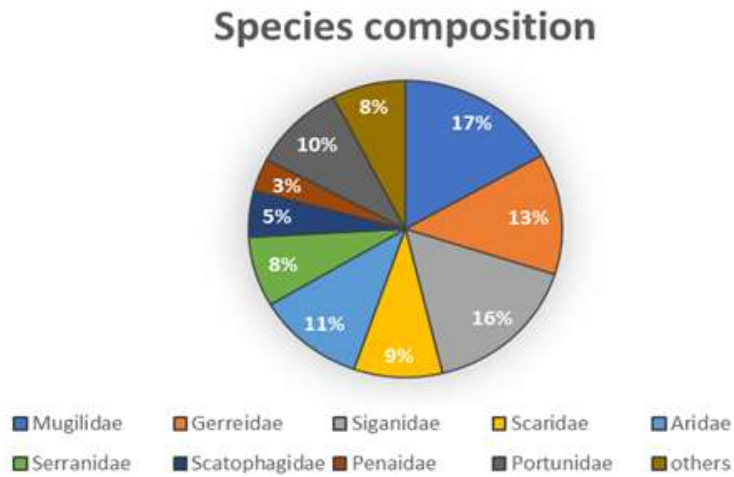
Figure 15: Species composition of identified fin fish and shellfish in Navanthurai & Karainagar

Table 2: Identified fishes and shell fishes in selected lagoon fishing village landing sites

Family	Species Name	Tamil Name	Common name
Mugilidae	*Mugil cephalus*	Kayal meen	Flathead grey mullet
		Siraiah	Bluetail mullet
	Valamugil buchanani	Paalai	White mullet
	Mugil curema		
	Ellochelon vaigiensis	Thiruvan	Squaretail mullet
Gerreidae	*Gerreomorpha setifer*	Thirali	Black stiped silver biddy
Siganidae	*Siganus javus*	Oora	Steaked spinefoot
	Siganus oramin	Oddi	White spotted spine foot
Scaridae	*Scarus guacamaia*	Kizhi	Rainbow parrot
Aridae	*Arius caelatus*	Keliru	Cat fish
Serranidae	*Epinephelus malabaricus*	Kalavai	Groupers
	Aporops bilinearis	Kalavai	Blotched podge
Scatophagidae	*Scatophagus argus*	Ilaththi	Spotted scat

		Kooni raal	Indian white shrimp
Penaidae	*Metapenaeus monoceros* *Penaeus indicus* *Penaeus monodon*	Vella raal	White shrimp
		Karu raal	Giant tiger prawn
		Neela nandu	Blue swimming crab
Portunidae	*Portunus pelagicus* *Portunus sanguinolentus* *Charybdis natator*	Mukkan nandu	Three spot crab
		Karukkan nandu	Red crab

Catch Per Unit Effort - An indirect indicator of a target species' abundance in fisheries and conservation biology is the catch per unit effort (CPUE) (Hossain, Hasan, Alam, & Mazumder, 2014) . An effort often consists of the kind of equipment being utilized, its size, and the amount of time it is being used. According to CPUE of current study Stake net reported significantly higher catch rate for finfishes (8-14 kg finfish in Navanthurai; 4-8 kg in Karainagar). Fyke nets were used to catch shrimp (2-5 kg in Navanthurai; 5-10 kg in Karainagar). Stake net gear wass mostly operated in both villages due to its high efficiency.

Market structure & fish supply chain

All the fishermen in both fishing villages sold fish catch to auctioneers and whole sellers. Vendors and collectors who were mostly mobile traders, bought fish catch from auctioneers, packed the catch in iced boxes and transported it by a foot bicycle or motorbike to the nearest market or directly to consumers, because the profit margins gained from lagoon fishing are small to sustain another element in the value chain. But the fishermen did not receive higher prices for their harvest at the fish landing site. Navanthurai had strengthen their marketing system than Karainagar due to the availability of stakeholders. (Figure 16 & figure 17)
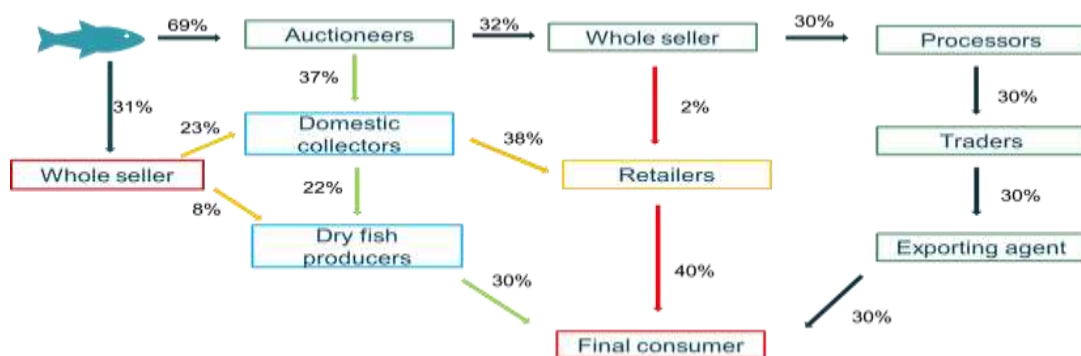

Figure 16: Percent Composition of supply chain of Marketing System in Navanthurai

Figure 17: Precent Composition of supply chain Marketing system in Karainagar

Fishing craft owners, fishers, retailers, auctioneers, and dried fish producers had moderate awareness on sustainable fisheries, impact of fishing on the socio-economic development and on reducing negative socio-economic environmental impacts. They were well aware on fishing environment. According to the Table 3 & Table 4 the overall mean values of awareness of the importance of fishery sustainability were 3.61 and 3.48 in Navanthurai and Karainagar respectively. Research was scanty on the awareness of fishing community on the importance of lagoon fishery sustainability

Table 3: values for awareness on importance of fishery sustainability in Navanthurai.

Variables	Mean	Level of awareness
Awareness of sustainable fisheries	3.48	Moderate awareness
Awareness of the impact of fishery on the socio-economic development	3.62	Moderate awareness
Awareness of concern on the environment	3.73	Good awareness
Awareness of suggestions to reduce negative socio-economic environmental impacts	3.61	Moderate awareness
Awareness of the importance of fishery sustainability	3.61	Moderate awareness

Table 4: values for awareness on importance of fishery sustainability in Karainagar.

Variables	Mean	Level of awareness
Awareness of sustainable fisheries	3.31	Moderate awareness
Awareness of the impact of fishery on the socio-economic development	3.50	Moderate awareness

Awareness of concern on the environment	3.69	Good awareness
Awareness of suggestions to reduce negative socio-economic environmental impacts	3.45	Moderate awareness
Awareness of the importance of fishery sustainability	3.48	Moderate awareness

Fishery management of two fishing village was a community-based type co management. Fishing society regulate and manage fishing activities with socio-economics especially in Karainagar. Navanthurai fishing cooperative societies were based on religious group such as St. Thomas and St. Nicklaws.

4. Conclusion

Fishermen of Karainagar and Navanthurai are aware of the sustainability of the fishery; The market structure was strong in Navanthurai but Karainagar where awareness activities on market access is essential. Optimum management strategy is required in these two fishing villages. The community based co management is a commonly applicable fishery management strategy in northern fishing community. Particularly lagoon fishing community in Navanthurai had a sustainable co management practice for the development and management of lagoon fishery. As a result, their socio-economic status and fishery status are in semi sustainable levels. In Karainagar lagoon fishing community also have community-based management but it is not active therefore their socio-economic status and fishery status are comparatively poor than Navanthurai.

Recommendations: Proper guidance regarding the fishery management is recommended. Relevant authorities must focus on creating proper community based co management practices within fishing society for optimum fishery management   with improved socio-economic status in Karainagar & Navanthurai. Low literacy levels, improper market channels and lack of training and awareness programmes are the limitations of proper management of the concerned fisheries.

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