

## **Social and economic aspects of collective action in the stake seine fishery of the Negombo estuary**

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### **Abstract**

**KEY WORDS: COMMUNITY BASED MANAGEMENT, USER RIGHT, ECONOMIC PROFIT, PURE PROFIT**

Stake seine fishery in the Negombo estuary is in existence since 16<sup>th</sup> century. This fishery mainly targets at shrimp resources in the Negombo estuary. As a community based fisheries management system, the stake seine fishery has been a focal point of many researchers due to its exclusive characteristics. This paper is based on a study conducted in 2001 on the stake seine community. It examines the social and economic aspects of stake seine fishery to uncover its contribution to social and economic well being of the stake seine community. Out of 284 stake seine owners 42 were interviewed. Membership eligibility rules, operational rules and sanctions facilitate the community based management process of the stake seine fishery. Net return of an owner was about 98,000 LKR/craft/annum. This indicates that the stake seine fishery is economically viable. In every social and economic aspect such as income, education and standard of living, stake seine community shows a satisfactory or better level compared to national level indicators. The community based management principle supported by suitable regulations can be gainfully adopted in other small scale coastal fisheries as well.

### **Introduction**

Most civilizations, notably those of indigenous populations around the world, have developed mechanisms and institutions for the management of fishery systems. However, process of colonization in many nations including Sri Lanka, destroyed their traditional management arrangements. Furthermore, over the past century the industrialization and commercialization of fisheries globally have led to neglecting traditional local means of management (Johannes, 1978; Berkes, 1999). In the vacuum created by this loss in traditional management, serious fishery declines have been commonplace. In response to these, a new centralized model of management emerged focused on governments having the role and responsibility to manage the fish in the sea, these fish being recognized

as a Common Pool Resource(CPR). Governments became the dominant players in the management process. Intense regulatory measures were undertaken to control fishers, fishing fleet and processors, with the various aims of fish stock conservation, allocation of benefits from the fishery and resolving user conflicts.

Unfortunately, this approach to management does not work as planned. In fact, many such efforts proved to be futile or indeed counter productive. Fishers, being excluded from the formulation of rules, had no incentive to follow them. As a result of these developments traditional community based management systems have regained popularity among scientists and managers all over the world.

The Negombo stake seine fishery is a precious example of such traditional local means of management of fisheries resources since 16<sup>th</sup> century. According to Wanigabadu(1978) during the reign of the Sinhala king Parakarmabahu VI in 1412 to 1467, there was an Indian invasion. The Indians were defeated at Puttalam, mainly under the leadership of three families called Kurukulasuriya, Warnakulasuriya and Mihindukulasuriya mudianse. The King gifted these three clans the villages in Grand street, Sea street and Kurana street in Negombo on their victory. The descendents of these families still live in Negombo and their main occupation is fishing. These three families were the forefathers of inventing stake seine fishery in the Negombo lagoon. In the past instead of present nylon net, cotton nets were used for stake seine fishing. Limited entry in the fishery has been maintained by means of sociological and cultural barriers. In the past when conflicting situations arosed in resource sharing the catholic church involved in conflict resolution. These customary practices were finally legalized by imposing the Negombo (Kattudel) Fishing Regulations in 1958 (Atapattu, 1987).

At present, the fishermen from villages of Grand street, Munnakkaraya, Sea street, Kudapaduwa, Duwa, Pitipana street, Pitipana, Thaladuwa and Mankuliya are engaged in this fishery (Wanigabadu, 1978). In the lagoon there are specific locations where the stake seines are operated. These are called "kattudel padus" where the user righst are in force. There are 22 stake-net *padus* (sites). In the lagoon, there are different channels along which there is a flow of water during high and low tides. In these channel segments of the lagoon, the people living in the surrounding areas, operate stake seines.

The Negombo stake seine fishery has drawn a significant attention of researchers due to its exclusive characteristics(Amarasinhe et al, 1993&1997, Anon., 1994, Jayawardene, 2001 & 2002). There is a plenty of literature

available on the biological aspects of Negombo stake seine fishery. However, literature on the social and economic aspects of stake seine fishery are meager. In the application of community based fisheries management principles to open access fisheries systems, comparable statistics are very important.

Hence the objectives of the study were to investigate the application of customary property rights, mechanism of equitable sharing of shrimp resources and the socioeconomic status of the stake seine community of the Negombo estuary.

### **Materials and methods**

There are 4 stake seine fishery associations comprising 284 fishermen in the study area (Table 1). Fifteen percent of the total population was selected, applying stratified sampling method, for the study. The sample comprised 42 stake seine fishing households.

**Table 1: Fishermen Population and the sample**

Stake seine Fishermen's Association	Total number of fishermen	Percentage of total fishermen	Number of fishermen selected
Grand street SFA	86	30.3	13
Sea street SFA	68	23.9	10
Duwa-Pitipana SFA	92	32.4	14
Pitipana SFA	38	13.4	5
Total	284	100	42

Source: Records of Stake seine Fishery associations, 2001

### **Data collection**

Participatory Rapid Appraisal (PRA) was the main survey technique used for the study. Data collection was carried out administering a questionnaire during 2001. In addition to the questionnaire, a check list/interview guideline was used for the data collection. Meetings with office bearers of stake seine fishery

associations( SFA) and interviews with senior community personal were used for validation of data collected. Moreover, the author participated in fishing site(*padu*) allocation meetings (*pelle*) and observed the mechanism of *padu* allocation. Secondary sources of data and information also were used for the study.

### Data analysis

- a Operating profit = (Revenue- Variable costs)
- b Financial profit = (Revenue- Financial costs)
- c Financial profit to variable cost ratio = Financial profit/Variable costs
- d Financial profit to revenue ratio = Financial profit/Revenue
- e Rate of return to total financial costs = Financial profit/financial costs
- f Pay back period of financial costs = Financial costs/Financial profit
- g Rate of return on investment = Annual financial profit/ Total investment
- h Pay back period of investment = Total investment/ Annual financial profit

Mainly, average( mean) and percentage values were calculated for the interpretation of data. Economic analysis of the stake-net fishery was done using the above formulae.

### Limitations of the study

This study mainly focused on the community component rather than the fishery component of the stake-net fishery. Therefore, changes in catch and fishing effort were not investigated. However, an in-depth study of the stake seine fishery should comprise both the fishery as well as the community components. The biological component of the stake seine fishery is comprehensively discussed by Jayawardene (2001 &2002) and some biological aspects are studied by Amarasignhe et al (1993). Moreover, the study was performed within a period of short time. Hence, the sample was limited to 15% of the respective population

### Results and Discussion

#### Membership eligibility rules

Fishermen from villages of Grand street, Sea street, Kudapaduwa, Duwa, Pitipana street, Pitipana, Thaladuwa and Mankuliya engage in stake seine fishery. The fishermen have been organized into four Stake Seine Fishermen's

Associations. The four associations are Grand street SFA, Sea street SFA, Duwa-Pitipana street SFA and Pitipana SFA.

There are 284 fishermen in the four stake seine associations (Table 2 )

**Table 2: Membership and property right quotas assigned for the church & SFAs**

<b>SFA</b>	<b>Number of membership under each group in SFA</b>	<b>Quota assigned for the church/SFA</b>	<b>Total number of property right quota</b>
Grand street SFA			
Group 1	42	10	52
Group 2	44	10	54
Sea street SFA			
Group 1	34	6	40
Group 2	34	6	40
Duwa-Pitipana street SFA			
Group 1 (Pitipana)	48	12	60
Group 2 (Duwa)	44	11	55
Pitipana SFA	38	7	45
<b>Total</b>	<b>284</b>	<b>62</b>	<b>346</b>

Source: Survey data

The management team of an SFA comprises the President, the Secretary, the Treasurer and a number of committee members depending on the total number of fishermen in each SFA. They are elected at the Annual General Meeting (AGM) usually held in March every year. The election is held in a free and fair environment. Both office bearers as well as members enjoy similar status and benefits from the fishery.

The right of resource sharing in the stake seine fishery is vested upon the members of the stake seine association. Only the descendents of the stake seine families are eligible to apply for use right. The use right is transferred from generation to generation patrilineally. There are three customary practices in passing the use right from generation to generation.

- 1 The youngest son of a stake seine family automatically gets his father's use right after his death.
- 2 The other sons willing to engage in stake seine fishery are eligible to apply for the use rights after they get married.

- 3 An unmarried son over 30 years of age can apply for the use right in writing to the SFA declaring that he intends not to marry.
- 4 A female member of the family is not eligible to apply for use right.

This patrilineal inheritance of property rights acts as an access barrier to the stake seine fishery. Hence, it prevents over-exploitation of resources. There were 17 *padus* in the second schedule of regulations in 1958, but at present *padus* Saikalvai, Erakalvai, Kattapadu, Godaelamanga and Harakoluwa also have been added. Therefore, there are 22 stake seine *padus* at present 57-60 stake seines can be operated. The Grand street SFA, Sea street SFA and Duwa-Pitipana street SFA use these *padus* 10 days per month. The Pitipana SFA uses three *padus* every day and three *padus* 10 days per month.

Each stake-net fishery association allocates the respective fishing days for members using a lottery method.

### **The mechanism of equity sharing of shrimp resources**

#### **Grand number allocation (*Maha nommaraya*)**

All members present at the annual general meeting (AGM) of SFAs are assigned numbers using a lottery method. This number is called the grand number. There are 1 to n numbers (n= number of fishermen in the SFA). The grand numbers 5, 10, 15, 20, 25 ,.....etc., are called box numbers. Excluding box numbers the rest are assigned among the members. The grand number 1 holder have the right to select any *padu* for fishing on 1<sup>st</sup> fishing day after the AGM for the respective SFA. On the next fishing day, the last grand number holder (n) is eligible to select any *padu* for fishing. In sequence the chance will be rotated (n-1), (n-2), (n-3), (n-4)... etc. So every grand number holder gets a chance to select any *padu* with higher returns. During this rotation of numbers 1st number goes to n<sup>th</sup> place. Grand number n goes to (n-1)<sup>th</sup> place. In this method grand number 2 holder gets the last fishing day in one rotation. The box numbers are auctioned on the respective fishing day. So the number holders have the chance to select any *padu* at the bidding in a competitive environment. The bidding amount goes to Stake-net Fishery Association. Out of this box numbers 15, 30, 45 are allocated for the respective church. The bidding values of these numbers go to the church fund.

## **2. Small number (*Pelle/ Heen Nommaraya*)**

Once in four days the members of each SFA meet for the allocation of small numbers. This meeting is called *pelle* meeting. Among the members present at the *pelle* meeting small numbers are drawn to allocate *padus* other than the *padu* of grand number holder for the respective fishing day. Among the small number holders for the respective fishing day the other *padus* are allocated. Depending on the small number held, the members of the SFA get a chance to select a *padus* remaining after the previous small number holder has selected a *padu* for the day.

Except Pitipana SFA, the other three SFAs are grouped into two groups as 1 and 2. As a result of the increase of eligible fisher population, the Grand street SFA has reduced the number of permitted fishing days per member from 10 to 5 days. The two groups of Grand street SFA alternatively share the fishing days and accordingly a member of each group gets 5 days use right per month. But in case of Sea street SFA and Duwa-Pitipana SFA, each group alternatively share eastern and western channel segments in the lagoon. Generally, each member gets 10 days use rights per month. Members of Pitipana SFA operate 2 *padus* (5 sites) everyday and 3 *padus* (16 sites) 10 days per month.

### **Operational rules**

A member of an SFA is traditionally bonded to honour the following rules imposed by the stake seine fishery association.

- 1 The use right holder should be physically present and participate in fishing operation and cannot employ any other person to fish. However, a member who is physically unfit to operate a stake-seine could request in writing to the SFA to manage his use right. In such a situation, the SFA auctions his grand number or small number. A half of the bidding value goes to the SFA and the other half goes to the use right owner.
- 2 Use right holder should use his own canoe.
- 3 Stake seine should comply with recognized specifications.
- 4 The net must be fixed not exceeding 15 m width of the net.

### **Sanctions**

One who violates the rules is subject to the following sanctions.

- 1 Two fishing days use right will be banned when the use right holder does not go for fishing after *padu* is allocated. Because the opportunity of another member to operate his stake seine in the respective *padu* for the day is missed.
- 2 Four fishing days (4 *pelle*) use right will be banned in case of using others' canoe for fishing operation. This sanction not valid for box numbers.
- 3 User right will be temporary suspended until a net complying with the recognized specifications is provided.
- 3 A Violator of the 15 m width rule is ordered by the SFA to pay a fine of 100 LKR for every 0.5 m beyond the permitted width.

### **Income sharing**

Operating profit (Revenue-Variable costs) was shared according to a traditional norm practiced among stakeholders of the stake seine fishery (Amarasinghe et al, 1993). Those stakeholders are the respective church in the area, Stake seine Fishery Association, fishermen who are also members of SFA, helper and the auctioneer. Prior to stake seine fishery regulations which were imposed in 1958, the church had a traditional role of mediating and conflict resolution in the stake seine fishery. However, even after regulations were promulgated as an appreciation of past role assumed by the church each SFA allocates 4% of its profit to the respective church. The operating profit is therefore shared as follows.

Fishermen and the helper	- 90%
The church	- 4%
Auctioneer	- 3%
SFA	- 3%

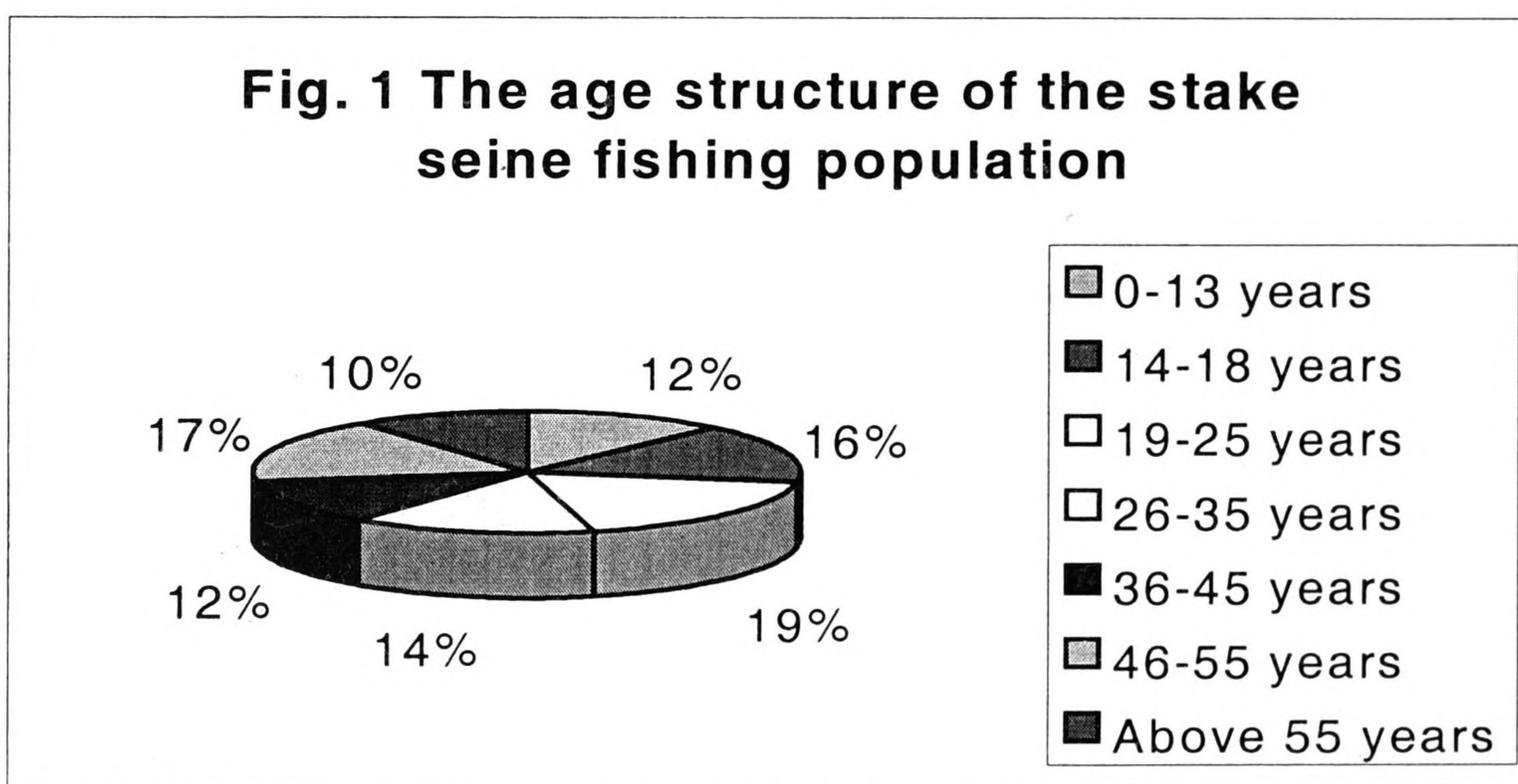
Normally the SFA's share is redistributed among members in lean catch months. At present however, this norm is not practiced by all SFAs. For example, Grand street SFA allocates income from auction of 15, 30, 45,...etc box numbers to the church.

### **Demographic characteristics**

All members of the Negombo stake seine fishing community are Roman catholic by religion. This unique feature is associated with the customary practice of stake seine fishery since 16<sup>th</sup> century. Any person than a Roman Catholic is

unable to enjoy stake-net fishing rights and any conversion to other religion will result in discontinuation of fishing rights(Wanigabadu, 1978).

The age structure of the stake seine population differ significantly from national age structure (CBSL,2000), especially, in age groups from 1-13 and above 55 years. In the stake seine community, the percentage of population in the age groups 1-13 and above 55 years 12% and 10% respectively while the respective figures at national level were 25.1% and 13.3%. This means that the dependency ratio in the stake seine community was lesser when compared with national level figure. The age group 19-25 years also shows a similar disparity recording 19% in the stake seine community and 12% at national level. In addition mean family size was 5.3 in a stake seine family whereas national level figure was 4.1. The mean age group of the total community population was 32 years. It indicates the total community population is reaching middle ages and it was a sign of population aging. Moreover, mean age of stake seine fishermen was 53 years.



This implies that old members engage in the stake seine fishing. That is a result of entry restrictions imposed by the community. A son of a stake seine fisherman is eligible to apply for fishing right only after he gets married. Otherwise the youngest is son eligible to have the fishing right after his father's death. According to Wimalasena & Rupamoorthy (2000) fishermen's mean age in small scale marine fishery was 37 years. Because the small scale marine fishery is governed by open access nature hence no entry limitations for the fishery.

## Educational level

Table 3 indicates educational attainments of stake seine fishing community with reference to the national level statistics.

**Table 3: Educational background of the stake seine fishing community**

<b>Educational level</b>	<b>Stake seine community (%)</b>	<b>National level(%)*</b>
No schooling	5.5	8.6
Primary(0-5)	19.2	35.2
Secondary(6-11)	58.9	35.5
GCE(O/L) passed	6.8	20.7 <sup>1</sup>
GCE(A/L) and above	9.6	

Source: Survey data

\*Central Bank of Sri Lanka (2000)

<sup>1</sup>GCE(O/L) and above

The category of no schooling was less in the stake seine community compared to national level figure. Similarly, 58.9% had completed secondary level education but at national level that was only 35.5%. The dropout rate from primary level in stake seine community is approximately half of the national level. Moreover, 6.8% and 9.6% have passed GCE(OL) and GCE(AL) respectively. However, for both categories 20.7% passed in national level. The literacy rate in the stake seine community was 95% and that was higher than the national level(CBSL, 2000). As a whole, the stake seine community shows comparatively higher educational status than the national level and that is a plus point for the community based management system. This is a result of better educational facilities available and the higher portion of family income being allocated for education when compared to national level figure as shown in Table 8.

## Capital investment, variable and fixed costs

All the costs of fishing are borne by the property right owner. Mean total investment for a stake seine fishing unit was about 29,176 LKR. This comprises the cost of traditional canoe, fishing gear and wooden poles which needs to be fixed to the net. Fishing operation incurs two types of financial costs. One is variable cost which is needed for the day to day operations. The other is the fixed cost, generally calculated on an annual basis. Table 4 depicts components of variable and fixed (financial) costs associated with one unit of stake seine fishing operation. Of the total cost, the variable cost per year was 96.7% and fixed cost was 3.3%. Fuel, food and beverages, labour and repair and

maintenance costs were the types of variable costs. Labour is the most important input which accounts for 80.3% of variable costs.

**Table 4: The yearly cost structure of stake seine fishery**

<b>Cost item</b>	<b>Amount(LKR)</b>	<b>Percentage(%)</b>
Variable costs		
Labour	45,533	77.6
Fuel	6,816	11.5
Food & beverages	1,520	2.6
Repair & maintenance	3,000	5.1
Total variable costs	56,669	96.7
Fixed costs		
Depreciation on investment	1,945	3.3
Total financial costs	58,614	100

Source: Survey data

Maintenance refers to the regular care of fishing assets, putting back into good condition the craft and gear. Expenditure on repair and maintenance was borne by the owner of the fishing assets. The repair and maintenance of stake seine fishing unit was only 5.3% of the variable costs.

Fixed costs usually comprise license, and insurance fees and depreciation of assets. However, craft licensing and insuring in stake-net fishery were not observed over the sample. Therefore, the fixed cost shows in table 4 comprises depreciation of assets. Depreciation was calculated based on the historical cost of capital assets. For the purpose of depreciation, the life span of capital assets (craft & gear) were taken as 16 and 3 years respectively. The depreciation cost is therefore, 1,945 LKR per fishing unit per year. Therefore, total financial cost of a fishing unit per year was calculated as 58,614 LKR.

### **Profit and rate of return**

The operating profit was calculated by deducting the variable costs from the total revenue while financial profit is arrived at by deducting financial cost from the revenue. Operating profit can be used to determine whether it is worthwhile continuing the fishing operation in the short run. As long as variable costs are recovered, the fishing unit can continue operation in the short run as the unit has reached the break-even point until either the situation is improved or fixed assets are liquidated (Panayatou, 1985).

Financial profit on the other hand indicates the long run profitability of a fishing operation. The rate of return on investment shows the rate at which the initial investment can be recovered and how soon. Where the rate of return on investment is higher, the initial investment can be recovered sooner. Table 5 presents economic indicators of the stake seine fishery under consideration. The rate of return on investment and pay back period were 3.4 and 0.29 years respectively. This implies that the stake seine fishery is able to recover its investment relatively sooner. The rate of return for ring-net and gill-net fishery were 2.01 and 16.84 years respectively (Vidanage et al., 2000). Hence borrowed capital for investment can be paid back sooner in the stake seine fishery.

**Table 5: Economic indicators of stake seine fishery per craft per year**

<b>Economic indicator</b>	<b>Amount</b>
Revenue(LKR)	156,614
Variable costs(LKR)	56,669
(a) Operating profit(LKR)	99,945
(b) Financial profit(LKR)	98,000
(c) Financial profit to variable costs ratio	1.73
(d) Financial profit to total revenue ratio	0.63
(e) Rate of return to total financial costs	1.67
(f) Pay back period of financial costs	0.59 (218 days)
(g) Rate of return on investment	3.4
(h) Pay back period of investment	0.29 (108 days)

Source: Survey data

The rate of return on financial costs is an indicator, the rate at which the financial costs can be recovered and how soon. Table 5 shows that in the stake seine fishing 1.67 LKR have accounted by profit for every rupee of financial costs spent. The pay back period of financial costs was 218 days. The rate of financial profit to variable costs refers to the net income that can be realized for every rupee of variable costs spent. Where the ratio is closer like one to one it means that the fisherman is capable of financing the next fishing operation assuming all things remain constant. Another indicator of profitability is the ratio of financial profit to revenue. This explains the financial profit for each rupee earned as revenue. This ratio for the stake seine fishery was 0.63.

### **Pure economic profit**

To determine the pure economic profit from the fishery, opportunity costs are deducted from the financial profit earned by the owner and the crew. For the

study, the pure economic profit of the owner and the crew represents the return on capital and labour respectively.

Financial profit is obtained by deducting total financial cost from the revenue. Financial profit to owner was 98,000 LKR per craft /year or 8,166 percraft/month. The opportunity cost of the owner's capital, labour, management and skill have not been considered when financial profit was calculated. As per the study of Jayawardene (2001) mean monthly income per operation varied from 750-4980 LKR with an annual mean of 2050 LKR. Further, he stated net monthly income per fisher was about 13,667 LKR (range 5,000 to 33,200).

The opportunity cost of capital represents income forgone by the craft owner who invests in fishing instead of in financial market. The opportunity cost of capital was estimated at 17% (the prevailing bank rate for fixed deposits in 2001). The opportunity cost of owner's labour is the income forgone (estimated at 325.97 LKR/man day/crew member of a FRP boa) by managing his fishing gear instead of working in another job (Vidanage et al, 2000). After the opportunity cost of owner's capital and labour were deducted from financial profit, a pure economic profit of 53,923.68 LKR was shown as earned by the stake seine owner(see Table 6).

In the stake seine fishery, in addition to owner, one crew member (helper) is engaged in fishing operation. The helper gets 10-20 % or 2/3 of devisable income according to the norm practiced between the owner and the helper. An owner who cannot involve in activities such as net mending, craft maintenance pays a higher share for his helper compared to fulltime stake seine fisherman. The annual mean income of a helper was about 4533 LKR. The opportunity cost of crew labour was calculated as in previous case.

**Table 6: Owners pure economic profit per craft per year**

Cost item	Amount (LKR)
Owner's financial profit	98,000
Less: Opportunity cost	
Capital(a)	4459.92
Labour(b)	39116.4
Equal: Owner's pure economic profit	53,923.68

Source: Survey data

**Table 7: Pure economic profit of labour per craft per year**

<b>Cost item</b>	<b>Amount (LKR)</b>
Income of the helper	45,333
Less: Opportunity cost of labour	39,116
Equal: Pure economic profit of labour	6,216.60

Source: Survey data

The economic or resource rent from fishery was estimated by summing the boat owner's and labours pure profits. The pure profit of stake seine fishery was 60,140.28 LKR per craft per year.

From all economic indicators, it is obvious that fishing by stake seine is profitable. Moreover, this indicates that the stake seine fishery has the potential to absorb fishing effort further. But property right regime of stake seine fishery does not permit to increase fishing effort in the short run.

### **Family income and expenditure**

The average yearly consumption expenditure of a stake seine fishing household is shown in Table 8. The total yearly consumption expenditure of a stake seine fishing family was 141,456 LKR and that shows income from the fishery is not sufficient cover there living expenses. Therefore, yearly consumption expenditure per head was about 26,6890 LKR. A major portion of family income of stake seine fishermen comes from additional income sources. The yearly mean fishery income and other incomes were about 98,000 and 161,760 LKR respectively. Therefore, total family income was about 259,760 LKR per year. Out of this income 161,760 LKR was spent on consumption. The additional income sources other than stake seine fishery were fish vending, marine fishing, private and public sector employment. The stake seine fishing operation begins at dusk or later in the evening. Hence stake seine fishermen were able to engage in other income generating activities during the daytime. Gradually, stake seine fishing has become an additional income source of the stake seine fishing community.

Stake seine families spent 7.2% for energy sources while the national level figure is 3.9%. That means they use more energy for lighting and cooking purposes. About 13,896.6 LKR was spent on liquor and smoking amounting to 9.8% of total expenditure which shows a sign of social problem among them. The percentage of educational expenditure of a stake seine family is higher than that of national level figure. The better educational attainments of the stake

seine community in the future may experience a shift of labour from fishing to other sectors. However, increased educational level of the community may secure the community based management of the stake seine fishery. Moreover, they spent 3.8% of their family expenditure for entertainment/recreation. As Roman Catholics they spend more on church feasts every year.

**Table 8: The yearly consumption expenditure of a stake seine family**

Item	Value(LKR)	Percentage(%)	National percentage(%)
Food & beverages	97583.3	68.9	48.4
Clothing and apparel	4933	3.5	6.3
Education	5133	3.6	2.3
Housing	-	-	
Cooking fuel	4451.3	3.1	3.9
Lighting	5729.3	4.1	
Water	1264	0.9	n.a
Medical	2474.7	1.7	2.4
Entertainment/recreation	5333.3	3.8	n.a.
Religious	606.6	0.4	n.a.
Liquor/smoking	13896.6	9.8	n.a
Other	-	-	11.8
<b>Total</b>	<b>141456</b>	<b>100</b>	

Source: Survey data

### **Ownership of property and assets**

The ownership of property and assets shows the standard of living among stake seine fishers (Table 9). Land and house ownership, refrigerator, television, washing machine, telephone and gas cooker usage shows a better situation of the stake seine community.

### **Domestic energy usage**

As a source of energy for cooking, LP gas was used by 43.8% of households (Table 10). However, 50% households used firewood. About 90% households had electricity connections mainly for lighting purposes. At national level only 56.8% households had electricity in 1997 (CBSL, 2000).

The sanitary conditions of stake seine fishing community also shows a satisfactory level. Eighty seven percent had access to pipe borne water and out of them 46.7 % had in-house pipe borne water. Among stake seine households 93.3% had flush or water sealed toilets. In every aspects of living the stake seine community shows a comparatively higher level of standard of living.

**Table 9: The ownership of property and assets of the stake seine fishing community**

<b>Property/asset</b>	<b>Households (%)</b>
Own permanent house	86.7
Own land	80.0
Relatives land	13.3
Unauthorized land	6.7
Living with relatives	13.3
Motor bicycle	26.7
Push bicycle	66.7
Refrigerator	46.7
Washing machine	13.3
Gas cooker	46.7
TV	73.3
Video player	6.7
Audio setup	33.3
Radio	86.7
Telephone	20.0

Source: Survey data

**Table 10: The domestic energy usage of the stake seine community**

<b>Energy</b>	<b>Families (%)</b>
<b>Cooking :</b>	
Firewood	50.0
Kerosene	6.2
LP Gas	43.8
Electricity	00
<b>Lighting:</b>	
Kerosene	6.7
Electricity	93.3

Source: Survey data

### **Welfare of the fishermen**

Welfare activities of SFAs mainly confined to providing grants for funerals of stake seine families. Each association grants different amounts depending on the financial status of the SFA. The Grand Street SFA pays 10,000 LKR for a funeral of a member and 5,000 LKR for other family members. The other SFAs pay Rs. 5,000-1,000 for a member's funeral and about 1,000 LKR for other family members funerals.

## **Conclusions and Recommendations**

### **Conclusions**

The principle organizational characteristics of the community based management system of Negombo stake seine fishery remain unchanged in a rapidly changing socio-economic environment.

In the past conflicts among stake seine fishermen was resolved by the church. However, after the Negombo (Kattudel) Fishing Regulations (1958) were imposed there were hardly any such situations and the church's role has gradually declined.

With the increase of the number of stake seine fishermen the temporal rules have been changed. As a result, number of days available per fisherman is declining. At present a member of the Grand Street SFA gets 5 days per month.

The community based management of Negombo stake seine fishery provides an equitable distribution of economic gains from the fishery. In addition to that it facilitates and promotes co-operation and social harmony among the members of the community.

The stake seine fishery has become a source of additional income rather than the main income. Hence, the stake seine fisherman engages in other income earning activities in the daytime as the stake seine fishing is operated at night.

### **Recommendations**

Community based management of Negombo stake seine fishery should be further studied and secured at because any break down of such a system will lead to severe socio-economic problems among the fishing community. The

increasing fishing effort could be optimized by limiting the operational days for each SFA.

Application of such a system for other small scale fisheries based on co-management principles elsewhere will help manage coastal fish resources which are being over exploited at present in a sustainable manner.

The fundamental problem of the stake seine fishery is the system of customary inheritance of fishing rights only to male members in a family. However, further in depth studies need to be consideration to examine this problem before any intervention is contemplated.

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