

SOCIO-ECONOMIC AND LIVELIHOOD RELATED ISSUES OF CRAB COLLECTORS IN KOGGALA LAGOON IN GALLE SRI LANKA

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ABSTRACT

Little attention has been paid to develop crab fishery in Sri Lanka though there is a potential for development of this industry in the coastal belt of the country. The most popular areas for crab fishery in Sri Lanka are *Negombo, Chilaw, Batticaloa, Koggala, Tangall, Dikvalla* and *Trincomalee*. This study was carried out in Koggala, Gall district to identify the socio-economic situation of crab growers; to investigate the harvesting, processing and marketing methods; to identify the issues related to livelihood of crab collectors and to make appropriate suggestions to overcome the recognized issues. Primary and secondary data were collected for the study.

Almost all the crab collectors who are living around the Koggala lagoon were personally interviewed to collect primary data. Variables related to socio-economics of the crab collectors were collected to analyze the situation. The descriptive statistics and Pearson's correlation test were employed to analyze the data. A majority of the crab collectors belonged to middle age category. Their education level was low and did not completely depend on crab fishery as the income source. They found to engage on various activities such as crab collecting, sea fishing and fish selling. Average annual income and income from crab collection were recorded as SLRs 177,960 (US \$ 1,618) and SLRs 76,560 (US \$ 696), respectively. However, a majority of crab collectors were in middle level wealth condition. Their monthly harvest ranged from 0 to 200kg with an average of 35 kg. All the crab collectors sold their production to regular buyers and to the tourist hotels. Further, crab collectors followed especial post-harvest methods and categorize the harvest into three types depending on the size before selling.

Key words: Crab Fishery, Livelihood, Income

INTRODUCTION

Crab fishery, initiated as small scale industry in early 1990s in villages close to *Negombo* lagoon, has now become a profitable industry in several areas in the coastal belt of Sri Lanka. Crab fishery involves, capturing of just-molted crabs (water/ mud crabs) from wild and fattening under captivity with a variety of food such as fish offal, shark heads, cockles *etc* for 2 -3 weeks before harvesting for sale. Both sexes are used for fattening and the fattened crabs are sold to local market and for export to Southeastern and Pacific countries. This industry is very popular among the small-scale fish farmers due to simple technology involved, low investment required and high profit margins.

In Sri Lanka, the area under brackish water estimated to be around 120,000ha of which 40,000ha are shallow lagoons and mangrove swamps. These areas are endowed with rich

bottom fauna and flora, a potential source for fattening of mud crabs (Caddy and Cochrane 2001). At present, there are no established crab culture or fattening farms in Sri Lanka. In view of the increasing demand for crabs for export market, Sri Lanka can explore its full potential to initiate an organized crab culture and fattening industry (Chin-How-Cheong and Anandakoon 1991). Currently the most popular areas for crab culture in Sri Lanka are *Negombo, Chilaw, Batticaloa, and Trincomalee*.

This study was done in Koggala, Galle to identify the socio-economic situation of crab growers; to determine methods used for harvesting, processing and marketing; to identify the issues related to livelihood and to make appropriate suggestions to overcome the recognized issues. The study will help concerned policy makers to evolve and inculcate appropriate livelihood development approaches in order to enhance the wellbeing of this community.

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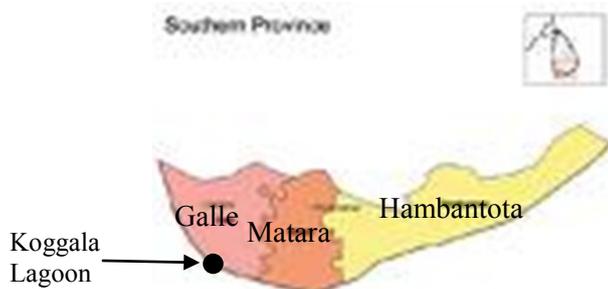


Figure 1: Study Location

METHODOLOGY

The study was conducted in Koggala lagoon in Galle district in the Southern province Sri Lanka (Fig 1). Crab collectors who live around Koggala lagoon were interviewed to collect primary data. Primary data was collected by observations and personal interview with the help of an interview schedule. Additional information was collected through systematic field observation. Of the 35 crab collectors, 30 were interviewed. In addition, past research articles were used to obtain secondary information.

Information on age, education, family size, income, family education background, wealth of the family, nature of the occupation, experience, major cost components for the occupation, seasonality of occupation, amount of harvest, selling amount, post harvest methods and processing, market place, price, training received, job satisfaction, occupational related health hazards, membership of societies and source of credits were collected. Method developed by Sandika (2009) and Sandika and Withana (2010) were used to measure the selected variables. The empirical measurement of the selected variables are given in Table 1. The descriptive statistics such as mean, percentage and Pearson's correlation test were used to analyze the data.

RESULTS AND DISCUSSION

Socio-economic characteristics of crab collectors

Age of the crab collectors ranged from 17 to 74 years with a mean of 43.9. The education level found to be low, with a majority (56%) studied up to primary (Grade 5) level. The mean family size determined to be 6 (range 2 - 9). These findings are in agreement with those of

Sandika (2009) and Sandika and Withana (2010). This indicates that poor interest of young people for crab culture. Income is the most important factor for the sustainability of any livelihood. The respondents' income found to be a composite of various activities. Most of the respondents engaged in crab collecting, sea fishing and fish selling to ensure sufficient income for their daily expenditure. Annual income of the crab collectors ranged from SLRs 72,000 (US\$ 655) to SLRs. 480,000 (US\$ 4,364) (US\$ 1 = SLRs 110) with an average of SLRs 177,960 (US\$ 1,617). Average annual income from crab collection alone recorded as SLRs 76,560 (US\$ 696). These figures were in agreement with those given by Samonte and Agbayani (1992) - from SLRs 24,000 (US\$ 218) to Rs. 240,000 (US\$ 2182). The contribution from crab culture to total income found to be 8 - 100 % with an average of 46%.

Family education background is other important socio-economic indicator to measure the living condition of the respondents. Education levels of the family members' were measured by developing family education index. It was noticed that a majority (57%) of the crab collectors' family education was low. Nevertheless, wealth of the family is other important socio-economic indicator to measure the living condition. Family wealth was measured by developing family wealth index with including the house type, facilities, family vehicle, electrical and other equipment. Family wealth of the respondents was relatively high. Majority of crab collectors (70%) were in middle level wealth condition. The important feature of this category was that they have permanent house with tile floor, brick and cement wall, tile or asbestos sheets, radio, television, telephone (mobile or land), basic furniture for their house and at least a motor cycle as family vehicle. These results prove that their economic and wealth condition is satisfactory because their earnings were relatively high. It is therefore, suggested that crab collection is good income sources for unemployed low educated youth.

Job related characteristics of crab collectors

All crab collectors indicated that their father or grandfather engaged in similar occupation and

Table 1: Variable and their empirical measurement

Variable	Measurement
Age	Chronological age in completed year
Education	Grade
Family size	Number of family members
Income	SLRs per year
Family members education	Family members education index
Wealth of the family*	Family wealth index
Nature of the occupation	Fulltime or part time
Previous occupation	Previous occupation of the respondents
Experience	Number of years engaged in crab collection
Cost components	Major cost items and portion to total cost
Seasonality of occupation	Major crab collecting months of the year
Amount of Harvest	Average harvest (kg) per year
Selling amount	Average selling amount (kg) per year
Post harvest and processing	Adopted post harvest and processing methods
Market Place	Selling place
Price	Price (SLRs)
Training received	Number of training received
Job satisfaction**	Five point Likert Sale
Membership of the societies	Yes or no
Source of credits	Formal or informal credit sources

* Wealth of the family of this study was defined as condition of house and availability of furniture and electronic equipments.

** Job satisfaction in this study was defined as the extent to which respondents like or dislike carrying out their jobs crab collection

the family influenced them to continue this activity. About 83% of crab collectors have not done any other occupation previously. Other have worked as labors before entering into this activity. A majority of crab collectors engaged in sea fishing as an additional source of income. The experience varied from 1—50 years with an average of 23 year (Table 3).

Major cost items of crab collectors identified as boats, nets, hand nets, snare, floaters and baits. The cost was divided into basically capital and variable or operational. The cost for boat, nets, hand nets, snare, floaters have been identified as sub items for capital cost. Average capital cost recorded as Rs 11 (US \$ 0.1) to 95 (US \$ 0.86) per annum. Further, about 51%, 16%, 19%, 13%, and 5% recorded as capital cost for the boat, hand nets, nets, rings and other items, respectively. The major operational cost was recorded as the cost for baits (*ama*). Daily cost for baits was around Rs. 300 (US \$ 2.7).

Seasonality of occupation is commonly seen in marine fishing. Nevertheless, seasonal impacts on livelihood of crab collectors were negligible. According to 70% of respondents, there was no any seasonal effect on their livelihood. About, 30% of respondent mentioned that December to March period is off season due to low availability of crabs during that period.

Monthly crab harvest ranged from 0 to 200kg/ person with an average of 35kg. About 80% of the crab collectors harvested less than 40kg/ month and 7% of respondents have harvested more than 200kg/ month (Table 3). Selling quantity is the most important point in any business. This is directly correlated with income of the respondents. Respondents mentioned that selling was not an issue because they were able to meet the market demand for crabs. Other important point was that they have verbal agreement with the buyer to sell the harvest with predetermine price for different quality of crab. The respective buyers purchase crab three times per week. In addition, tourist hotels in the area also buy crabs. Hence, selling of the crab was not an issue for crab collectors.

Post harvest handling and processing are some of the most important point which should be considered by the producers of highly perishable food items like vegetable, fruits, meat, fish or crab. Crab collectors have adopted to special postharvest methods before selling their harvest. Unless they adopt to the correct methods of postharvest techniques they may unable to sell their production. Collectors put rubber band to all pairs of legs of the crab just after catching to control the movements. Afterward crab are stored in the plastic baskets. Grading is other important post-harvest requirement. Mainly, there are three types of grades which are depending on the size of the crab. Sathiadhas and Najmudeen (2004) pointed out that average weight of jumbo size crab (Grad I) was 1.5kg (> 800g). Weight of the grads II crabs range from 500g to 750g. The weight of the grad III crab is recorded as 450g to 200g. Price of the product is the most important fact which influences the income of the respondents. Price is depending on the size of the crab. The price of the jumbo size (Grad I) was recorded as Rs. 1,200 (Us \$ 11)/ kg. Grade II and III prices were recorded as Rs 800 – 600 (Us \$ 7.2- 5.5)/ kg and Rs 500 – 200 (Us \$ 4.5- 1.8)/kg, respectively. The grad I and II crab are often perches by the buyers with no hesitation. Job satisfaction is most important job related variable which can influence to get high job performance. A half of crab collectors were in indifferent level of job satisfaction (Table 3). Low harvest due to low availability of crab in the lagoon, competition among the members to harvest the crab, low social

Table 2: Socioeconomic characters of mushroom crab collectors

Variables	Categories with Percentages (%)			
1. Age (Year)	Young (30 %)	Middle (42%)	Old (28%)	Total (100%)
2. Education (Grade)	Primary (56%)	Grade 6 - 9 (44%)	Ordinary/Advance Level (0%)	Total (100%)
3. Experience	Low (23%) (<15 year)	Medium (50%) (16-30 year)	High (27%) (31< year)	Total (100%)
4. Family background	Low (57%) (<17 score)	Medium (37%) (18-34 score)	High (06%) (35 < score)	Total (100%)
5. Family wealth	Low (3%) (<11 score)	Medium (70%) (12-22 score)	High (27%) (23 < score)	Total (100%)

Table 3: Job related information

Variables	Categories with Percentage (%)			
1. Job experience	Low (15year) (23%)	Medium (16-32) (50%)	High (33< year) (27%)	Total (100%)
2. Harvest (kg/month)	< 40 (80%)	41 – 80 (13%)	81 – 200 (7%)	Total (100%)
3. Job Satisfaction	Dissatisfy (23%)	Indifferent (50%)	Satisfy (27%)	Total (100%)
4. Memberships*	Fish cooperative (60%)	Welfare society (40%)	Non members (40%)	Total (100%)
5. Accessibility to credit	Yes (50%)		No (50%)	Total (100%)

recognition for their occupation were the possible reasons for their low satisfaction level though their income was high. It is therefore, needed to take appropriate measures by the relevant authorities not only to increase job satisfaction of the respondents but also to solve their problems. Membership of the societies shows the strength of social capital of the respondents. About 60% of respondents have taken the membership of the fishery cooperative society while 40% of them have recorded as member of social welfare societies which are functioning in their villages. This should be taken into account by the policy makers, researchers and other social mobilizers to organize them before any research or community development activity.

Access to credits is one of major requirements to develop the livelihood of any society. About 50% crab collectors have not taken any credit from out sources (Table 3). It shows the reluctance to take credit for their livelihood development. They have further mentioned that their income was sufficient and their negative attitudes towards further development. That was due to their low education level. It is therefore, important to change their negative attitudes towards the development by conducting the appropriate training programs. On the other hand, 50% of respondents have taken loans for their livelihood development. The loan amounts taken by the crab collectors have varied from Rs 10,000 (US \$ 91) to 30,000 (US \$ 273). Majority have taken the loan from *Samurdhi* Bank. Others have taken from private and NGOs base formal institutes.

Correlation among the different variables

Age and experience of the respondents were positively correlated ($r=0.7$, $p=0.00$). Monthly income was significantly and positively correlated with income from other sources ($r=0.85$, $p=0.00$). With regard to the cost of the crab collection, fixed cost was significantly and positively correlated ($r=0.47$, $p=0.02$) to the total cost. It clearly explains that major cost of crab collection was capital cost such as boat nets etc. Further, operational cost was very low. Other important point is that income of crab collection was significantly correlated with the fixed cost ($r=0.39$, $p=0.03$). Therefore, It can be clarified that the person who can expend more for capital items such as for boat, nets, hand nets, snare and floaters etc will be help to earn more than others. The significantly positive correlation ($r = .40$ $p=0.02$) was shown between membership of the communities or organizations and accessibility to formal credit. It means that join to community society will be help to get the formal credits (Table 4).

Issues related to livelihood

A high majority (76.7%) of collectors have mentioned that mixing of sea water with the lagoon water due to frequently opening of sand bar of the lagoon (Table 4). According to respondents, this was not frequently occurred previously. The possible reason for the situation was not recognized. So, further research needs to be done to recognize the reasons. They have mentioned further, it leads poor breeding of the crab. There was no any

Table 4: Correlation values

Variables	r value	P value
1. Age and experience	r = 0.7	P = 0.00
2. Monthly income and income from other sources	r = 0.85	P = 0.00
3. Fixed cost and total cost	r = 0.47	P = 0.02
4. Crab collection and fixed cost	r = 0.39	P = 0.03
5. Membership of the communities or organizations and accessibility to formal credit	r = 0.40	P = 0.02

action taken to control this issue so far by relevant authorities. It is therefore need to make an appropriate measure to prevent the situation. Almost equal present (10%) have indicated that low harvest and harvesting of immature crab as second problem. People tend to collect the immature crab due to low harvest.

All respondents mentioned that making barrier to control flow of sea water in to lagoon is the ideal strategy to control the situation. It is therefore recommend to the relevant authorities to carry out a research with the purpose of make cost effective, social and environment sound solution for this issue. It further would be helped to safe the biodiversity too in the lagoon. Moreover, respondent have suggested that imposing by introducing appropriate regulation to protect the breeding areas of crab and immature crab. Therefore, this should be taken into care by the relevant institutes and authorities. In addition, educational campaigns can be organized as an alternative method to educate the people who collect the immature crab.

As adopted in inland fisheries and Shrimp farming industries, introducing artificially bred immature crab to lagoon is also a possible solution to overcome the problem of natural breeding of crab. It is therefore suggested to conduct research on this matter to check the potential.

CONCLUSION AND RECOMMENDATION

Crab collectors' income is not completely dependent on one activity. Hence, their economic status is satisfactorily good. Major cost item of the livelihood of crab collectors were identified as cost for boat, nets, hand nets, floaters and baits etc. Even though the harvest is highly variable the average found to be 35kg/month. This harvest provides significant

Table 4: Issues related to livelihood

Problem	Percentage
1. Mixing of sea water with the lagoon water	76.6
2. Low harvest	13.4
3. Harvesting of immature crab	10.0

income for the respondents. Marketing of crab is not a major issue for collectors. Further, crab collectors have adopted to especial post harvest methods before selling their harvest.

Mixing of sea water with the lagoon water due to frequent opening of sand bar of the lagoon, poor breeding of the crab and low harvest lead to making suitable door which can control the sea water flow in to lagoon is the ideal strategy to control the situation.

It further would help maintain the biodiversity in the lagoon. It is suggested to introduce appropriate regulation to protect the breeding areas of crabs and immature crabs. Therefore, this should be taking into care by the relevant institutes and authorities. In addition, campaigns can be organized as an alternative method to educate the people who are collecting the immature crab. Further, impotence of adopting appropriate strategy to manage the fisheries resources was highlighted by the many researchers. Introducing artificially bred immature crab to lagoon to overcome the problem of natural breeding is one possible suggestion that requires inputs from research

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