

Sustainable Utilization of the Negombo Lagoon [A case study of Special Area Management (SAM) Project for the Negombo Lagoon]

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ABSTRACT

Negombo lagoon, shallow coastal body of water located on the West coast of Sri Lanka, has had a long association with the fishery industry in Sri Lanka. During the past twenty five years, development activities associated with the fisheries industry in Negombo lagoon have taken place without due consideration to the aquatic environment within the lagoon. In this study an attempt was made to identify the major factors that determine the use of illegal fishing methods which disturb the sustainable utilization of the lagoon, to examine the factors determine fishing income of the fishermen and to explore the contribution of the Special Area Management (SAM) project in order to reduce illegal fishing in Negombo lagoon.

The results indicated that the fishing method used in Negombo lagoon was significantly determined by the participation to awareness programs, initial capital requirement and cost of fishing. This study also revealed that the fishing income of the fishermen is significantly determined by the fishing method used, education level, and fishing experience of the fishermen.

KEY WORDS: Illegal Fishing, Negombo lagoon, Special Area Management (SAM) project

INTRODUCTION

The Negombo Estuary is approximately 12.5 km in length and its width varies from 0.6 to 3.6 km. Its mean depth is estimated to be approximately 0.65 m and the surface area to be 35 km², thus placing its volume to be of the order of 22.5 million m³ (The SAM Plan, 2003).

In spite of the fact that Sri Lanka has a relatively high Human development Index (HDI) overall, the majority of families living in coastal areas fall in to the poorest category. The fishing community in general lacks decent housing, as well as basic supporting social amenities. Their economic problems are compounded by seasonal variations of household income, which is primarily gained from fishing in coastal and lagoon areas. The declining household income of the communities in the coastal areas has been attributed to the depletion of resources, competition for resource use and inadequate opportunities for alternative income generating activities. There is increasing pressure on the resource use and problems are acute in areas where coral reefs are mined, mangrove areas are converted into aquaculture enterprises, and where fishing is more mechanized and destructive (Dayananda, 2004).

About 2000 fishing families depend on the Negombo lagoon. Due to the absence of adequate alternative livelihood opportunities, the natural resources, especially fish population, sea grass beds and mangroves in the Negombo lagoon are over exploited by the community.

According to current increasing pollution trend in Sri Lanka, the requirement of good projects to reduce the pollution and to improve living standard of poor people is very crucial. Ministry of Fisheries and Ocean Resources (MOFOR) made an attempt to protect and improve coastal zone of Sri Lanka by

launching Coastal Resource Management Project. The Negombo lagoon is one component of this project and it is known as Special Area Management (SAM) for Negombo lagoon, which started in year 2001, and it will be ended in year 2005.

To ensure the sustainable management of the Negombo lagoon it is important to conserve the natural habitats and extract only the sustainable fish yield, which does not exceed the reproductive capacity of the lagoon. Illegal fishing is the major factor that affecting sustainable production of fishing in Negombo lagoon.

Even though most projects state one of their objectives as to eliminate operating illegal fishing methods, it is still taken place in the Negombo lagoon. So it is very important to identify the factors affecting to the illegal fishing and make recommendations to overcome this problem.

Fishing operations using the following gears and methods are prohibited in the "Negombo Lagoon Management Area" by the Gazette Extraordinary of the Democratic Socialist Republic of Sri Lanka - 1998.07.30. (The fisheries and aquatic resources act, 1996).

- a. Trawl Net fishing operations.
- b. Push Net fishing operations.
- c. Moxi Net fishing operations.
- d. Gill Net or Trammel Net fishing operations on coral reefs on rocks.
- e. Digging out of polychaete worms.

The objectives of the study is to identify the socio-economic factors affecting to the illegal fishing in Negombo lagoon, to identify what are the factors affecting to the fishing income of the fishermen around the Negombo lagoon and to evaluate the contribution of the SAM project in reducing the illegal fishing methods in Negombo lagoon.

METHODOLOGY

Data Collection Method

Both primary and secondary data were used in order to achieve the objectives of the study. The primary data were collected by a field survey using a structured questionnaire. 84 fishing families were consisted in the sample. The stratified random sampling method was used to select the sample.

The other required secondary data was collected from previous studies, publications of the Coast Conservation Department and the Fisheries Department, etc.

Other than fishing community, the officers who were actively involved in the SAM project also personally interviewed to collect relevant information.

Analytical Procedure

To find out the factors affecting to the fishing income of the fishermen the Multiple Regression Model was used.

Table 1: Variables of the Model

Variable	Definition	Dummy
INC	Fishing income of the fishermen in Rs.	-
MET	Method of fishing	0=Legal 1=Illegal
EDU	Education level	0=below grade 7 1=grade 7 or above
EXP	Fishing experience in years	-
ICR	Initial capital requirement in Rs.	-
CoF	Cost of fishing in Rs.	-
PAP	Participation to awareness programs	0=No 1=Yes

Based on the above determinants of the fishing income, the econometric model could be constructed as follows;

$$INC = \beta_0 + \beta_1 MET + \beta_2 EDU + \beta_3 EXP + \beta_4 ICR + \beta_5 CoF + \beta_6 PAP + U$$

To find out the factors affecting to the use of illegal fishing methods in Negombo lagoon, the Multiple Regression Model was used.

Table 2: Variables of the Model

Variable	Definition	Dummy
EDU	Education level	0=below grade 7 1=grade 7 or above
EXP	Fishing experience in years	-
PAP	Participation to awareness programs	0=No 1=Yes
ICR	Initial capital requirement in Rs.	-
CoF	Cost of fishing in Rs.	-

Based on the above variables the econometric model could be constructed as follows;

$$\ln (Pi / 1-Pi) = \beta_0 + \beta_1 EDU + \beta_2 EXP + \beta_3 PAP + \beta_4 ICR + \beta_5 CoF + U$$

Where;

Pi = Probability of the illegal fishing

1-Pi = Probability of the legal fishing

The multiple regression model was analyzed using a Logit model in which a dependent variable takes a value of "1" if fishermen use illegal fishing method and "0" otherwise.

To identify the contribution of the SAM project towards the sustainable management of the Negombo lagoon descriptive statistical methods were used.

RESULTS AND DISCUSSIONS

1. Factors affecting to the use of illegal fishing methods

Table 3. Parameter estimates of the variables

Variable	Coefficient	z-value	p-value	Odds Ratio
Constant	20.811	3.07	0.002	
Education level	-1.026	-1.01	0.311	0.36
Experience	0.12318	-1.69	0.091	0.88
Participation to awareness programs	-4.147*	-2.77	0.006	0.02
Initial capital requirement	-0.00061*	-2.24	0.025	0.98
Cost of fishing	-0.06853*	-2.35	0.019	0.93

*Statistically significant at 0.05 level

Based on results obtained, the fishing method used in Negombo lagoon was significantly determined by the participation to awareness programs, initial capital requirement and cost of fishing. Eventhough initial capital requirement and cost of fishing statistically significant, the odds ratios of those variables are close to one indicating that increase in initial capital requirement and increase in cost of fishing of the illegal fishing methods minimally affect the fishermen to shift from illegal fishing method to legal fishing method. If cost of fishing of illegal fishing method is increased by 1 rupee the probability of shifting the fishermen from illegal fishing to legal fishing method is 6.85%. If initial capital requirement of illegal fishing method is increased by 1 rupee the probability of shifting the fishermen from illegal fishing to legal fishing method is 0.061%. It shows that the initial capital requirement difference between illegal fishing method and legal fishing method is considerable amount.

Low income of the fishermen is a major constraint to invest in legal fishing gears, and they often use destructive illegal fishing gears, which is inexpensive. It is one of the responsibilities of the government and other authorities that are engaged in environment conservation projects, to provide financial support for poor fishing families to initially invest on legal fishing gears or to shift from illegal fishing gear to legal fishing gear. The SAM project provide legal fishing gear equipment to selected poor fishing families who are operating illegal fishing gears

in the lagoon after collecting their illegal fishing equipment.

Most of the fishing gears operating in the Negombo lagoon take away under sized shrimp and fish, it is advisable to introduce suitable mesh regulations to the fish and shrimp fishery in the system. However prior to make any conclusion in terms of optimum mesh sizes for different gear types operating in system, further studies should be conducted (Jayawardana, 2001). Eventhough existing destructive fishing methods have been prohibited by the government Gazette notice, the new destructive fishing methods are emerging time to time. Therefore rather than mentioning illegal fishing methods in a Gazette notice it is better to state only legally accepted fishing methods in a Gazette notice.

2. Factors affecting to fishing income of the fishermen

Table 4. Parameter estimates of the variables

Variable	Coefficient	t-value	p-value
Constant	5316.0	6.01	0.000
Method of fishing	3176.9*	8.85	0.000
Education level	749.6*	3.10	0.003
Experience	25.56*	2.41	0.019
Participation to awareness programs	155.6	0.54	0.588
Initial investment	-0.11157	-2.00	0.051
Cost of fishing	6.724	1.49	0.141

R-Sq = 75.2% R-Sq(adj) = 72.6% *Significant at 5%

The estimated model with the specified variables explained 72.6% of the variability of the fishing income of the fishermen around the Negombo lagoon. Based on the results obtained, the fishing income of the fishermen was significantly determined by the fishing method, education level and fishing experience. If the education level increased from 'below grade 7 to grade 7 or above' the income of the fishermen will increase by Rs.749.6 per month. The one-year additional experience will increase the monthly fishing income by Rs.25.56. Fishermen who were operating illegal fishing methods earn additionally Rs.3176 monthly income than those who were operating legal fishing methods in Negombo lagoon. Eventhough illegal fishing methods lead to extract short-term higher gains due to over exploitation of the resources and it will badly affect the sustainable fish production in Negombo lagoon and thus reduce income in the long run.

3. The impact on illegal fishing methods by the SAM project.

It is clearly shown that the use of illegal fishing methods was reduced from 64% to 33% after the project. Some illegal fishing methods such as push-nets were completely eliminated as a result of the SAM project.

Even though illegal fishing methods are still practiced, the number of fishermen practicing illegal

fishing method has been drastically reduced by the SAM project during life span of the project (5 years)

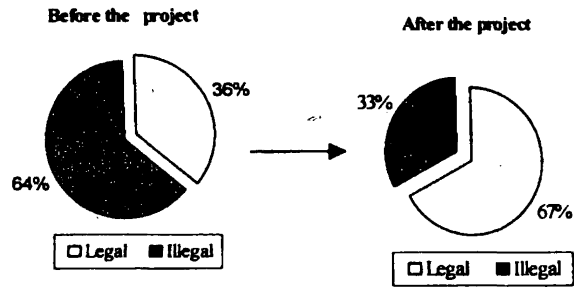
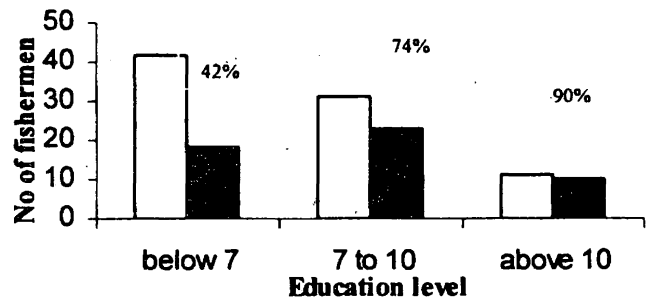


Figure 1: Proportions of legal and illegal fishing gears before and after the project.

After completion of the project, if there is no body to continue the activities done by the project, the effort made by the SAM project can be wasted. Therefore it is very important to dedicate the authorities and responsibilities to fishing societies and government authorities to look after activities of the project.

4. The relationship between Education level and Participation to awareness programs conducted by the SAM project



□ Total number of fishermen in each category
 ■ Number of fishermen participated to awareness programs

Figure 2: The relationship between Education level and Participation to awareness programs

The above graph clearly shows that the participation to awareness programs will increase with their education level. Only 42% of fishermen who are belonging to 'Below grade 7' category, were participated to awareness programs. 74% of fishermen who are belonging to 'Above grade 7 to grade 10' category, were participated to awareness programs. 90% of fishermen who are belonging to 'Above grade 10' category, were participated to awareness programs. Participation to awareness programs is one of the major factors that contribute in reduction of illegal fishing in Negombo lagoon. Since education level of fishermen is greatly affecting to the participation of awareness programs, education level of the fishing community should be improved by the projects, which are comply with the objective of reducing illegal fishing in Negombo lagoon.

The SAM project established number of pre schools around the Negombo lagoon for children of the poor fishing families. Eventhough primary school attendance is not a serious problem with these children, 50% of the children around the Negombo

lagoon stopped their secondary education before they coming to Grade 7 and join their parents to help in fishing activities. Therefore, it is very important to pay special attention to improve the secondary education of children in the fishing community, which most projects are not giving adequate attention up to now.

CONCLUSIONS

The results of this study highlighted that the participation to the awareness programs, initial capital requirement and cost of fishing are the major factors influencing selection of fishing method by fishermen around the Negombo lagoon.

Participation to the awareness programs conducted by the SAM project can be enhanced by the way of improving the education level of the fishing families around the Negombo lagoon, and it will support to shift illegal fishing methods to legal methods in the future.

This study also revealed that the fishing income of the fishermen was basically determined by the method of fishing, fishing experience and education level of the fishermen.

Eventhough illegal fishing methods are still practiced, the number of fishermen practicing illegal fishing methods has been drastically reduced by the SAM project during its life span.

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