Identification of Economic Vulnerability of Tsunami Affected Fishing Community in Sri Lanka:
A Case Study of Tsunami Affected Fishing Community in Kalutara District

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ABSTRACT

The Indian Ocean Tsunami that hit the country on 26th December 2004 has had severe impact on Fisheries Industry. It affected the fisheries infrastructure and community in 12 coastal districts out of 14. This study examined the tsunami impact on the vulnerability of fishing community of Kalutara district and the impact of the tsunami relief and rehabilitation activities on the level of vulnerability of this community.

A survey was conducted at three Fisheries Inspector Divisions (FID) in Kalutara District and Composite Vulnerability Indices (CVI) were computed by using Normalization method. CVI of fishing community of Kalutara District is 0.41 that indicates it's in average level of vulnerability.

The short-term rehabilitation and reconstruction strategies and programmes implemented to assist tsunami affected community to rebuild their living hood assets, to re-establish their fishing activities and to restart fish marketing, processing and distribution showed some success, in Kalutara District. However, institutional support facilities and services are not fully completed. This composite vulnerability computation, which can be applied to evaluate effectiveness and success of strategies and programmes, implemented at different locations.

KEYWORDS: Composite vulnerability index, Fishing community, Tsunami, Vulnerability

INTRODUCTION

Fishing industry has been identified as an imperative sector of the economy in view of its contribution to food security and nutrition of the masses, employment especially in the coastal belt, and foreign exchange earning. In 2005 it produced 300,000 tons of fish both from marine fisheries and inland fisheries. Prior to the tsunami the sector provided direct employment to 250000 people and sustenance to about 0.62 million dependents in the fishing households throughout the country. The sector earns about United States $ 100 million annually by the export of high value fishery products such as shrimp, Lobster, Tuna, Shark-fins and Cuttlefish (Anon, 2005).

Nature does not directly affect one segment of a population or another. Natural disasters disregard income, political affiliation, social boundaries, and religious differences. However, Settlement patterns do result in increased risk of some populations over others. Poor people may be displaced into less desirable areas or live in homes and communities that lack building codes or enforcement to regulate development in high-risk areas.

Natural disasters result in serious human casualties and economic loss. Fishing community is threatened by hazards because of their social and economic vulnerability.

According to Springer et al (2002) vulnerability may be defined in terms of the extent which the social structure of a community is expected to shock or stress brought about by economic strife, environmental changes and government policies and forces resulting from a combination of factors. Dabir-Alai (2004) used information concerning personal characteristics for example age, gender, level of education, and the number of dependents for developing vulnerability index. Gaiah and Imai (2006) used age of household, household size, owned area of land and schooling years of household head as variables for constructing vulnerability index.

The Indian Ocean tsunami that hit the country on 26th December 2004 has had severe impact on fisheries industry of Sri Lanka. It affected the fisheries infrastructure and the community in 12 coastal districts out of 14 in the country. More than 80 percent of the island's fishing fleet were wiped out, and more than 14,000 fishermen and their family members were killed by the tsunami (Athukorala, 2006).This study examined the tsunami impact on the vulnerability of fishing community of Kalutara district and the impact of the post tsunami relief and rehabilitation activities on the level of vulnerability of this community .

METHODOLOGY

Conceptual Frame Work and Research design

Briguglio (2006) was used Normalization procedure, for compute the vulnerability index. The Normalization method was adopted in measuring vulnerability of fishing community because it is relatively simple, easy to comprehend and appropriate to make comparisons. Normalization procedure commonly uses to adjust the observations to obtain a value of between 0 and 1, using the following formula:

$$Vij = (Xij - MinXi) / (MaxXi - MinXi)$$

Where,
V_{ij} = Standardized vulnerability score with regards to Vulnerability component i for community j
X_{ij} = Stands for the value of the ith variable included in the vulnerability index of community j.

Max X_i and Min X_i are maximum and minimum value of the observed range of values of the same component for all communities in the index.

Number of dependents, fishing days per month, household expenditure per month, household income per month and number of deaths in a fishing family were considered as socio economic variables for construct the Composite Vulnerability Index (CVI). The study hypothesized that the higher the incidence of these five variables in a given community, the higher is the degree of vulnerability in the community.

Data Collection

The Kalutara district of the Western province was purposively selected for this survey. Kalutara district is a one of highly tsunami affected fisheries district in western province of Sri Lanka. The survey was conducted in Kalutara, Beruwala and Panadura Fisheries Inspector Divisions (FID) in the Kaluthara district. These three FIDs were selected by using random sampling technique. Thirty fishing household were selected from each FIDs randomly. Data were collected from the fishing families who are affected by the Tsunami using pre-tested questionnaire. Survey was carried out from May to June 2006. Before commencement of the household survey, a leader's survey was carried out to understand the effect of tsunami and to identify the strategies implemented for rehabilitation and reconstruction of fishing community.

RESULTS AND DISCUSSION

Descriptive statistics for the variables are presented in the in Table 1.

The results reveal that, there are no significant differences among dependents, number of fishing days and average age of fisherman in these three locations. The households of each location have average of three dependents, twenty fishing days and thirty-seven years of age. Beruwala has the highest value for the average monthly income, compared with two other locations.

The results reveal that income of Panadura fishing households is two times higher than of Kaluthara FID.

Dabir-Alai (2004) used vulnerability index descriptors for the measuring of the community vulnerability. Fishermen's scoring between 0 and 1 signify a continuously escalating level of vulnerability as captured by the following set of descriptors. Table 2 presents the vulnerability index descriptor.

Table 1 - Descriptive statistics:

Kaluthara variables	Mean	Median	StDev	Min	Max
Dependents	3.133	3	0.776	1	4
Fishind days per month	20.7	20.5	3.64	12	28
Expenditure per month (Rs)	11100	10000	4103	5000	28000
Income per month (Rs)	11517	10500	5135	5500	35000
Land size (pur)	9.6	8.5	8.74	4.75	11.25
Value of fixed assets	196500	70000	374226	5000	1900000
Savings per month (Rs)	673	0	1187	0	200000
Loans (Rs)	8667	0	37300	0	200000
age	39.13	40	7.94	26	60
Beruwala vriables					
Dependents	2.7	3	0.952	1	5
Fishind days per month	19.633	20	4.752	12	30
Expenditure per month (Rs)	31817	13500	37609	6000	150000
Income per month (Rs)	40800	16000	50260	7000	200000
Land size (pur)	17.07	11	18.88	0	80
Value of fixed assets	1366383	60000	2947935	5000	10000000
Savings per month (Rs)	4467	1500	6678	0	25000
Loans (Rs)	60333	0	119033	0	40000
age	38.35	38	10.58	20	60
Panadura vriables					
Dependents	2.967	3	1.033	2	5
Fishind days per month	21.033	20	40679	11	30
Expenditure per month (Rs)	20267	14500	14183	6000	50000
Income per month (Rs)	23617	15000	18566	5000	65000
Land size (pur)	9.93	5.5	10.72	0	40
Value of fixed assets	249167	47500	507753	0	2500000
Savings per month (Rs)	2183	500	2746	0	10000
Loans (Rs)	68667	0	126102	0	500000
age	36.83	38	10.62	20	58

Table 2 - Vulnerability descriptors:

Descriptor	Vulnerability index
Weekly vulnerable	0.00-0.14
Mildly vulnerable	0.15-0.28
Vulnerable	0.29-0.43
Quite Vulnerable	0.44-0.57
Strongly Vulnerable	0.58-0.71
Extremely Vulnerable	0.72-0.86
Acutely Vulnerable	0.87-1.00

Source : Dabir-Alai (2004)

Calculated vulnerability indices for each location are presented in table 3. Apart from that it presents composite vulnerability index for Kaluthra district. In this framework an index of zero reveals complete absence of any real sense of vulnerability felt by the fisherman.

Table 3 - Vulnerability Index values and composite vulnerability Index values for FI divisions in Kalutara district:

Variables	Kaluthara	Beruwala	Panadura
Dependents	0.53	0.42	0.49
Fishing days per month	0.51	0.45	0.52
Number of deaths due to Tsunami	0.06	0.02	0.05
Expenditure/Income Ratio	0.64	0.53	_ 0.60
CVI for each Location	0.44	0.36	0.42
CVI for Kaluthara District	0.41		

The overall levels of vulnerability in Beruwala and Panudura FIDs are quite similar. The vulnerability of the Beruwala FID is slightly less. The Composite vulnerability index (CVI) for the Panadura FID is 0.42. It is indicated as" Vulnerable". This is a less vulnerability level according to the vulnerability index descriptor. The vulnerability in Beruwala seems to be low mainly due to the high income of fishing households and their wealth. One of major fishery harbour is located in the Beruwala, major anchorage for offshore multi-day boats. These multi-day boats manned by 4-5 fishermen and having crew accommodation, with built-in insulated fish holds, navigation and communication equipment etc., for offshore fishing. As a result, they earn high income due to the large capacity of multi day boat, which gives high fish yield. Apart from that, short-term reconstruction programme had been more effectively implemented in Beruwala than the other two FIDs in Kalutara district. The Cey-Nor Foundation Limited has given priority to repairing damaged crafts and the replacement of destroyed boats and outboard motors, in Beruwala than of the other two locations. Fishing community in Beruwala faced lesser problems from tsunami compared with other FIDs. Fishing households of Panadura and Kaluthara FIDs have similar characteristic, although fishing households of Panadura FID is less vulnerable due to the less intensified of the tsunami effect.

Composite Vulnerability index value of 0.44 of Kalutara FID indicated relatively high vulnerability score than of the other two divisions. Most of fishermen's of the area used traditional fishing crafts .The traditional inshore fishery has been employing simple canoes, mostly with outriggers and, despite development efforts spanning over 50 years, this type of boats still makes up nearly half of the fleet. As a result they earn relatively low income. Apart from

that the living hood of fishing households in Kalutara FID is locating very close to the sea, occurred serious damages to their productive assets as well as personal assets.

CVI for the Kaluthara district is calculated as 0.41. This is described as "Vulnerable". The value reveals that Kaluthara district is placed in average level of vulnerability. Kaluthara district is a part of western province with well-developed infrastructure facilities. Accessibility for the Kaluthara district for the rehabilitation and reconstruction programmes was convenient. As a result Kalutara district is in average level of vulnerability.

CONCLUSIONS

Marine fisheries of Sri Lanka is concentrated along the coastline of the island which was adversely effected and devastated when hit by the Tsunami disaster of 26th December 2004.Kaluthara district is a one of highly affected fisheries district in western province of Sri Lanka. The results of this study indicated that Kalutara district is in the average level of vulnerability. It reveals that the expected poverty status or future likelihood of poverty of fishers' household is at moderate level. This study also confirmed that short-term rehabilitation and reconstruction programmes were completed successfully in Kalutara district.

This vulnerability measuring technique can be applied to other tsunami-affected locations at different time. It helps to measure the effectiveness and success of the strategies and programmes implemented for rehabilitation and reconstruction of fishing sector through the vulnerability computation.

ACKNOWLEDGEMENTS

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