Fishermen's Perception and the Estuarine Set Bag Net Fishery in Bangladesh

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Abstract

A five point Likert scale was developed to study fishermen's perception of the Estuarine Set bag Net (ESBN) fishery of Bangladesh. Twenty five scalable questions with their probable answers were identified and ranked through focused group discussion with the fishermen and the key informant of the villages investigated. Every question was treated as an attribute or variable. These attributes were broadly categorized into five composite attributes: (i) present management status, (ii) bio-diversity, (iii) social structure, (iv) economic condition and (v) present occupational satisfaction. The combined mean value (4.46) for all variables, the means of the composite attributes and individual mean values for each variable were found significant at 5% level of significance. The highest mean (4.88) was observed for the variable "Have you ever been encouraged to practice community management system for ESBN fishery?" while the minimum mean value (3.61) was found for the variable "Which species would you prefer for commercial purposes?" For composite attributes, the highest mean (4.64) was observed for "Present occupational satisfaction" while the lowest (4.11) was found for "Bio-diversity". Seven components were extracted which altogether explained 60.86% of the total variance of all 24 variables included in the data set. The first, second, third and fourth components were found highly correlated with the variables included in the composite attributes "Bio-diversity", "Economic Condition", "Social Structure" and "Present Management System" respectively. The fifth and sixth components were found highly correlated with the variables associated with the composite attribute "Present Occupational Satisfaction".

Introduction

Fish is a public resource and should be managed through institutional arrangements that take the resource users' interests into account (Mikalsen & Jentoft, 2001). It is difficult for fisheries managers to have access to the fishery and monitor it because of the large number of participants and their widespread dispersion along the coastline. An in-depth understanding of the social, economic, political and cultural dynamics, as well as the history of a fishing community, is a prerequisite not only for improving the well being of the fishing communities, but also for the development of a wise management plan for the fishery. Lack of this knowledge often prompts profound feelings of social distance, distrust and alienation among fishers and managers alike. Yet while there has been widespread agreement concerning the importance of addressing this need, practical guidance for doing so has remained somewhat hard to come by (McGoodwin, 2001). As a result, small-scale fishing communities pose complex challenges for the management of sustainable fisheries.

Over the last decade, the trend in many countries has been to increase the role of national governments in the management of coastal fisheries. The role of control at local level, through traditional and informal management, has been ignored (Pomeroy, 1994). Coastal regions are typically multi-use, multi-stakeholder systems. Many regions have experienced a decline in coastal fisheries management which may lead to this system becoming unsustainable in the near future (Belfiore, 2000; Crean & Symes, 1996; Cicin-Sain *et al.,* 1995; UNEP, 1995). Hence, searching for integrated approaches to manage trade-offs and conflicts in these socio-ecological systems are essential for its sustainability (Hammer *et al.,* 2003).

As commonly accepted, the fisheries resources depletion is because of the practice of centralization of marine fisheries management (Satria & Matsuda, 2004), characterized by a national policy that all marine waters are state property, to be managed centrally, through the provincial, regional and village offices of the central government, for the benefit of the entire nation (Ruddle, 1993). This centralization regime was actually derived from Western industrialized nations that neglected common property regimes in fisheries (Gibbs & Bromley, 1998). Currently,

partial decentralization and community based fisheries management as an alternative to overcome the problem of resources depletion is gradually being practised in different countries.

Fishermen and fishing communities often possess a high level of knowledge regarding fish populations and ecology of the local coastal area (King & Faasili, 1999). They also have considerable understanding about social, cultural and institutional arrangements, resource allocation and conflict management. This information can be useful for designing development interventions or planning effective resource management systems (FAO, 1995). However, fishermen's perception regarding the overall fishery should also be evaluated in order to set up a new management plan that may help in determining the level of participation of the end users in the management.

The history of fisheries management in Bangladesh is relatively new. The management system is centrally administered by the government, using management approaches that have virtually no scope for getting closer to the voice of resource users. In Bangladesh, about 30% of the open water capture fisheries come from the coastal and marine sector (BFRSS, 2002). Among them, set bag net fisheries contribute about 30% and estuarine set bag net (ESBN) 73% (Mazid, 2002). Improved fishing materials, mechanized boats, good weather forecasting systems and relatively low investment are causing an increase in ESBN fishing, destroying the coastal fisheries resources of Bangladesh (Islam *et al*., 1993). The destructive nature of ESBN was also reported by Ahmed (1981), Islam (1987) and Chowdhury (1987). Khan *et al.* (1997) suggested the regulation of excessive fishing in near shore water as intense competition between artisan gears has led to a decline in the catch, ultimately lowering the income of small scale fishermen. Khan *et al.* (1997) recommended participatory management and an integrated community based development approach for the sustainable development of ESBN fishery. Motivated by the need for the inclusion of community based fisheries management for the estuarine set bag net fisheries of Bangladesh, the present study is a comprehensive evaluation of fishermen's perceptions of their fishery.

Materials and Methods

Study area

Bangladesh has a typical tropical multi-species fisheries ecosystem. A single operation of any type of fishing gear in any fishing area brings in a number of species of various sizes and ages. It also has the complexity of a multi-gear fisheries system, making the situation further complex for management and conservation of resources for sustainable use. The ESBN fishery is spread throughout the channels, canals, tributaries and estuaries of the country in a coastal and brackish water environment. This gear is operated mostly within a 10m depth line throughout the year. The present investigation was carried out in two districts of Bangladesh, Chittagong and Cox's Bazaar, as more than 50% of the ESBN fishing operation takes place in this region (Islam *et al.,* 1993). Two villages from each district were selected *viz.* Boro Kumira Jaladas Para of Sitakunda and Maddhom Para of South Kattoli in Chittagong; and Poschim Kutubdia Para of Charpara and Ghorokhghata Jaladas Para of Moheskhali in Cox's Bazaar. These villages were selected because the primary occupation is related to ESBN fishing. For convenience, the villages will be referred to as Charpara, Moheskhali, Kattoli and Kumira respectively. Their location is shown in Figure 1.

Research Methodology

The study used participatory methods with fishermen answering structured questionnaires. 25% fishing households were selected from each village through stratified random sampling and the. household chief was chosen as the respondent, regardless of gender.

The questionnaire consisted of a series of scalable attributes formulated using a 5 point Likert scale format (Likert, 1932; Pittaluga *et al.,* 2004). The probable answers were identified and ranked as "1=poorest perception", "2=perception is poor", "3=perception is moderate", "4= perception is higher" and "5=highest perception".

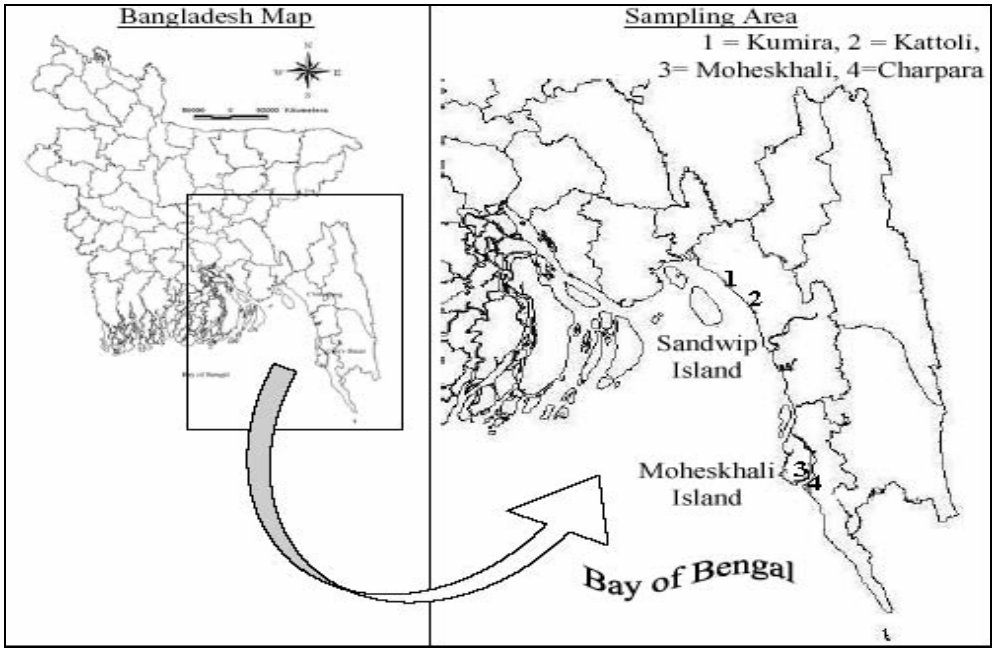

Figure 1: Location of the study area

Questionnaire Development

Two focus group discussions (Campbell & Salagrama, 2001; Pittaluga, *et al.,* 2004) were conducted in the selected villages with ESBN fishermen (8 to 12 fishermen per group) to find the scalable attributes (variables) appropriate to measure perception. Preliminary attributes were chalked out and one focus group discussion was conducted in each village with representatives of institutions (key informants) at village level. These included village leaders, teachers, religious leaders and representatives of local welfare groups. 25 single attributes were selected and possible answers for each attribute were ranked (one to five) to prepare the Likert Scale. The selection criteria for the questions were (Chamber & Conway, 1992; Campbell, 1999; Pittaluga *et al.*, 2004) –

i. Easily understandable and answerable by the fishermen
ii. Carrying great weight from a perception viewpoint (i.e. to index the perception)

Finally the selected 25 attributes were broadly categorized into five groups of composite attributes. Each composite variable comprised a set of dimensions that can be clarified using scaleable attributes. Such dimensions can be called micro variables and constitute a series of empirically observable facts. The composite attributes were as follows –

i. Present management status
ii. Bio-diversity
iii. Social structure
iv. Economic condition
v. Present occupational satisfaction

A full description of the questionnaire is presented in Table 1.

Hypothesis Setting

A statistical test of the mean for each attribute (variable) was carried out to check whether the population would consider the attributes to be significant or otherwise, following the formula (Ekanayake & Ofori, 2004):

$$\frac{\overline{X} - m_0}{s_x / \sqrt{n}} > t_{(n-1),a} \quad \text{..... (1)}$$

where, the random variable $t_{(n-1),a}$ follows a student's t distribution with $(n-1)$ degrees of freedom, $\overline{X}$ is the sample mean, s_x the sample standard deviation, n the sample size, and m_0 the critical rating above which the attribute

was considered as most significant. The null hypothesis was $H_0 : m \leq m_0$ against the alternative hypothesis $H_1 : m > m_0$, where 'm' was the population mean. The decision rule was to reject H_0 the calculated "t" value found larger than $t_{(n-1),a}$.

Hence, the statistical test needed to identify the 'more' and 'most' significant variable among them. Therefore, m_0 was fixed at "4", because, by definition, ratings 4 and above represent 'more significant' and 'most significant' variables according to the ordinal scale. The significance level was set at 0.05 following the conventional risk level (Ling, 1998).

The means of each attribute were tested individually. The combined means of each attribute and composite attributes were also calculated and tested.

Principle Component Analysis (PCA)
To find the attributes which actually account for the perception index, a "Principal Component Analysis" was conducted with variance maximization (varimax) rotation. The component with Eigen values greater than one was extracted from the solution. The component matrix provided the coefficient of correlation between components (factors) and variables. A rotated component matrix was used in this study as the loadings are more interpretable. The represented variables were the variables that have coefficient of correlation (r) greater than 0.60 (Kim & Mueller, 1978; Gorsuch, 1983; Kline, 1994; Said, 2003).

Results

Composite Variables
The combined mean value (4.46) for all variables was significantly higher than the fixed value (here, 4) at 5% level of significance ($p<0.05$). The highest mean (4.88) was observed for the variable "Have you ever been encouraged to practise a community management system for the ESBN fishery?" while the minimum mean (3.61) value was found for the variable "Which species would you prefer for commercial purposes?" (Table 1). For composite attributes, the highest mean (4.64) was observed for "Present Occupational Satisfaction" while the lowest was found for "Bio-Diversity" (Figure 2). The means of the composite variables and single attributes showed that the fishermen have a high perception regarding their fishery (Table 1). Percentages of the frequencies for each attributes are presented in Table 2.

Hypothesis Test
The mean values for all variables were significantly higher than the expected value at 5% level of significance. All the combined means of the composite attributes were also significant at 5% level of significance ($p<.05$) (Table 1).

Principle Component Analysis (PCA)
Using the PCA, seven components were extracted which altogether explain 60.86% of the total variance of all 24 variables included in the data set (Table 3). The variable "What is the religious structure of the society?" was not included as it does not have any variance for each single village.

The "Rotated Component Matrix" showed the components with their representative variables in shaded form (Table 4).

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.707. However, the significance level of Bartlett's test of sphericity was (0.000) which is less then 0.05 (Table 5).

Discussion

Present Management Status
The mean of the perception of fishermen for the first composite attributes i.e. "Present management status" was 4.49 which indicates a very significant perception about the present management system for ESBN fishery. Actually there is no management policy exclusively for the ESBN fishery of Bangladesh on the part of government. Some project reports recommended banning ESBN fishing in the near shore area (Akerman, 1986; Islam, 1987). However, there was no specific guideline for any alternative

income generating activity for the fishermen. The political and legal framework in Bangladesh strongly favours a central fisheries management system which normally ignores almost all forms of traditional community-based management systems. This is why the fishermen are not at all satisfied with the "Present management system" which was reflected in the present study (mean 4.60). Though both GOs and NGOs (Nandi, 1998) agree that a management policy should be developed for the ESBN fishery, there are no signs of the development of this process. This is mainly due to the virtual distance between policy makers and end users. For sustainable development of the fishery and the fishermen's community, co-management and community based management is emerging. To develop this practice for ESBN fishery, GOs and NGOs should encourage the community. However, the present study showed that such encouragement from fishery managers is limited. Almost 89% of respondents said that there is no encouragement for a local based management system from GOs and NGOs (mean 4.88).

Biodiversity

Bangladesh is a tropical country strongly affected by the monsoon weather. The tropical shore faunas are very rich and diverse in regard to fish and marine organisms (Lagler *et al.,* 1977). The regular flush of nutrient-rich silts from the upstream rivers and supply of organic nutrients from the mangrove litter falls, the coastal and marine area of Bangladesh has become one of the richest areas in terms of biological diversity and productivity (Islam, 2003). However, according to Islam (2003) there is a strong annual fluctuation in the composition due to weather. This opinion was supported by fishermen in the present investigation (mean 4.14). It is a general sense that fluctuation in composition will definitely affect the livelihood of fishermen as the unit price is different for each species or group of species. Khan *et al.* (1994) reported that the ESBN catch and composition fluctuates heavily without any clear indication of any one peak being dominant. This could be due to the presence of catches which have peak catch rates in different months. This view was also expressed by the fishermen. About 79% of respondents felt that the seasonal composition affected their livelihood. Most fishermen (76%) reported that the composition of species is decreasing. Their average perception was 4.26, indicating that they have a very good perception of the decrease of fish species over time.

There is a world wide awareness of the decrease of the total catch (Silvester *et al.*, 2003). About 82% of respondents agree that the total catch is decreasing. Their judgment scale was 4.43 which indicates a high level of awareness. The main commercial fish species of Bangladesh are Hilsha, Pomfrets, Ribbonfish, Croakers etc (Khan *et al.,* 2003). About 35% of respondents argued that "Hilsha/shrimp" would be the preferable catch as it is the most commercial species in Bangladesh. On the other hand, 25% preferred "Mixed fishes" because the ESBN operation is mainly for a multispecies catch; fishing focusing on any target species is not possible in ESBN. Though the average perception scale for the question "Which species would you prefer for commercial purposes" was lower than the test value (4.00), it should not mean that fishermen's perception is moderate for this attribute.

Social Structure

The selected villages were either fully Muslim dominated or Hindu dominated. This is a general scenario of the ESBN fishing community of Bangladesh. Fishing used to be operated by Hindu fishermen but poverty drove the nearby Muslim communities to engage in this profession too (Uddin (2000). Even so, the fishermen asserted that religion does not affect the occupation (mean 4.56) mainly due to the high social bondage between households and the community.

"How compact is your social bondage?" scored 4.68, supporting the authenticity of the above comment. A high level of cultural sharing prevails in the investigated villages irrespective of social and religious differences (mean 4.54). Women's involvement in the management system is one of the prerequisites for a community based management system. Fishermen

also acknowledged this. The score for the question "Do you encourage women's involvement in your occupation?" was 4.7 showing a high degree of responsiveness regarding women's contribution in this sector. In some areas of Bangladesh, women are already engaged in the ESBN fishery through post harvest processing.

Economic Condition

According to Pauly (1989) and McGoodwin (1990), fishermen are the poorest of the poor and small-scale fishing is an occupation of the last resort. This comment applies to the ESBN fishing community of Bangladesh. This study found that about 83% fishermen need to take loans for fishing and their perception of taking loan is very high (average 4.38). They also know that it is not possible for them to pay the loan back with due condition (average 4.35). They prefer private money lenders. The average rank for the attribute "Which organization do you prefer to take loans from?" was 4.58, expressing a very clear view about the economic condition of the fishery. The hidden reason is flexibility in the case of loan reimbursement when the loan is taken from a money lender. Fishermen usually sell fish at low prices to the money lender's representative. This is a hidden pre-condition for getting loans. Hence, the money-lender's profit doubles. They also get interest against the loan as well as buying fish at below the market price. This is why money lenders never put excessive pressure on the fishermen for repayment. On the other hand, public banks and NGOs have specific time limits for repayment which the fishermen cannot meet as there is no guarantee that the catch will be good enough for them to repay the loan. During the off-season, 42% fishermen take loans and 40% work as manual labourers. This is a general fact of the fishermen community and a highly significant score (4.37) was found for this attribute.

Occupational Satisfaction

The score 4.75 for the attribute "Are you satisfied with the present fishing occupation?" reflects high dissatisfaction regarding their present occupation. About 75% respondents showed this unhappiness. Nearly 78.7% wanted to change their occupation, the main reason being that it does not give them a secure livelihood. The following reasons were given for changing occupation:
(i) decreasing catch compared to the past, (ii) the level of livelihood is below their expectations and their standard of living is decreasing compared with previously, and (iii) unsecured fishing areas, which cause frequent losses of nets, boats and even lives.

Family members are also not satisfied with their occupation. About 63% want to switch to other income generating activities as their primary occupation. Low social status also affects the young generation to reject their parents' profession.

Principle Component Analysis (PCA)

Seven components were extracted which together explained 60.86% of the total variance of all 25 variables included in the data set. The measure of sample adequacy (Kaiser-Meyer-Olson Criterion) reached 0.70 which is a middling value.

The first component was highly correlated with all five variables included in the composite attribute "Biodiversity" and explained 18.15% of the total variance of the variables. These are the core elements of a fishery that are need to be assessed prior to management option development. They were selected through the group discussion with the fishermen; the present study indicated their high perception regarding the biodiversity of the ESBN fishing area.

The second component also contains all five variables included in the composite attribute "Economic Condition" and explains 9.81% of the total variance of the variables. Hence, the selection of these variables also carries great weight.

The third component correlated highly with the three variables which mainly stand for fishermen's perception regarding "Social Structure". Among them, the variable "How compact is your social bondage?" scored 0.84 which indicates a high perception regarding social bondage within households and the community.

The fourth component also correlated highly with the variables "What is the present management system from government?", "Are you satisfied with the present management system?" and "Have you been ever encouraged to practise community based management systems"? All the variables were from the composite variable "Present Management System". The fourth component explains 7.06% of the total variance of the variables.

The fifth and sixth components represent 6.73% and 5.17% respectively of the total variance of the variables. The variables were from the "Present Occupational Satisfaction" composite attribute.

Finally, the seventh component contained only one attribute "Do you need to pay tax for using fishing areas and landing centres?" This attribute correlated strongly with the composite attribute "Economic Condition".

Seven components were extracted composed of 22 single attributes from a total 24 attributes used in the principle component analysis. All the attributes were selected by a participatory method (group discussion with the researcher and the fishermen of ESBN fishery). Hence, it may be concluded that the attributes were highly significant and a minimum number of attributes were used to explore the perception of ESBN fishermen about their fishery as almost all variables were included in the extracted seven components. So through participatory research. good management options could be developed.

It is clear that fishermen have a good insight into the different aspects of the ESBN fishery of Bangladesh. These aspects are multidirectional and clearly related to their livelihoods as well as the fishery on which their livelihoods depend. All were selected through participatory discussion with the fishermen community. Hence, it is necessary to include the perception of fishermen for the development of management recommendations for the ESBN fishery of Bangladesh.

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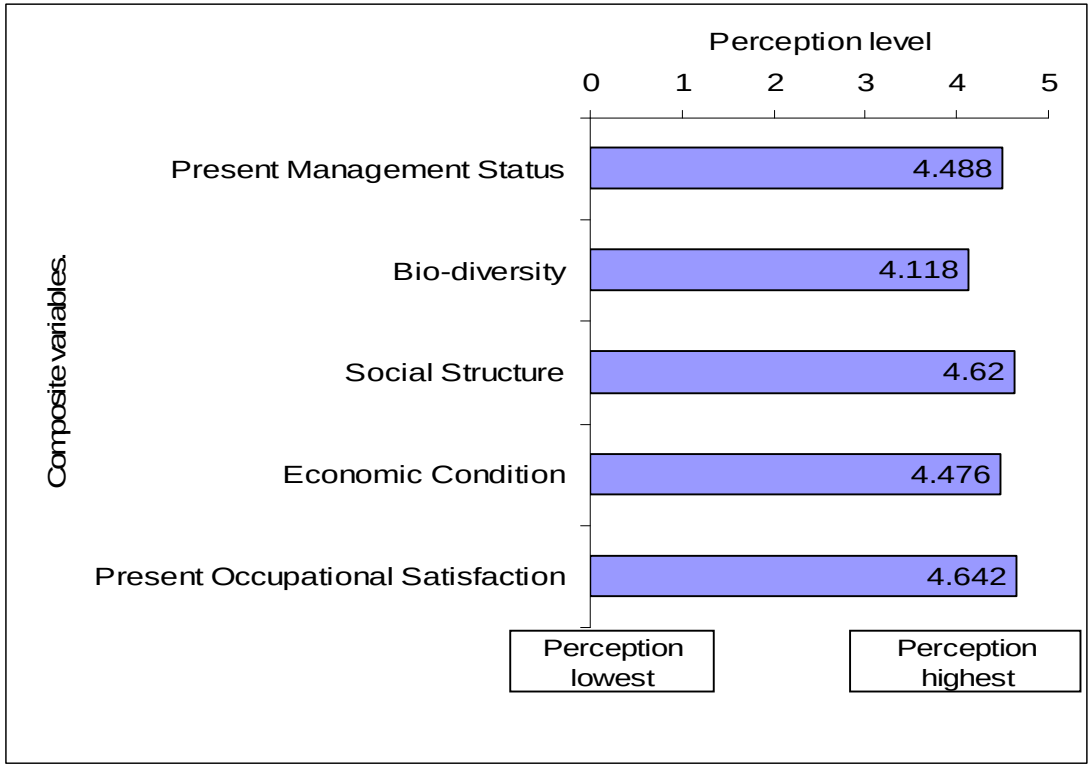
Perception level
0
1
2
3
4
5
Present Management Status
4.488
Bio-diversity
4.118
Social Structure
4.62
Economic Condition
4.476
Present Occupational Satisfaction
4.642
Composite variables
Perception lowest
Perception highest

Figure 2: Average means of the composite attributes.

Table 2: Means of attributes at different villages.

Composite Attributes	Study Area	charpara (n=120)		Ghorakghata (n=22)		Kattoli (n=20)		Kumira (n=110)		Individual mean (n=272)		Composite attributes mean (n=5)		Combined mean (n=5)	
	Single Attributes	mean	Sig.	mean	Sig.	mean	Sig.	mean	Sig.	mean	Sig.	mean	Sig.	mean	Sig.
Present Management Status	What is the Present management system from government?	4.483	0.000	4.227	0.329	4.200	0.428	4.555	0.000	4.47	0.0000	4.4880	.017	4.468	.008
	Are you satisfied with present management system?	4.567	0.000	4.636	0.000	4.500	0.029	4.645	0.000	4.60	0.0000				
	Do Govt. and NGO help you for management options?	4.067	0.510	4.273	0.186	4.000	1.000	4.218	0.036	4.14	0.0356				
	Do you need to pay tax for using fishing area and landing center?	4.333	0.000	4.909	0.000	4.400	0.042	4.255	0.021	4.35	0.0000				
	Do you encouraged to practice community management system for ESBN fishery?	4.933	0.000	4.227	0.234	4.900	0.000	4.945	0.000	4.88	0.0000				
Bio-diversity	Is there any seasonal variation in species composition?	4.100	0.207	4.227	0.234	4.150	0.481	4.173	0.028	4.14	0.0055	4.1180	.043		
	Does the species composition affect your livelihood?	3.983	0.820	4.227	0.261	4.500	0.000	4.264	0.002	4.15	0.0024				
	Species composition is increasing /decreasing through time series?	4.250	0.004	4.227	0.308	4.250	0.262	4.273	0.003	4.26	0.0000				
	Total catch is increasing/ decreasing then the past?	4.400	0.000	4.409	0.047	4.500	0.008	4.464	0.000	4.43	0.0000				
	Which species you should prefer for commercial purpose?	3.583	0.001	3.818	0.478	3.750	0.367	3.573	0.001	3.61	0.0000				
Social Structure	What is the religious structure of the society?	1.000	---	5.000	---	5.000	---	5.000	---			4.6200	.001		
	Dose your religion effect your occupation?	4.558	0.000	4.591	0.000	4.600	0.001	4.555	0.000	4.56	0.0000				
	How compact is your social bondage?	4.675	0.000	4.636	0.000	4.700	0.000	4.682	0.000	4.68	0.0000				

	Do you share your cultural tradition with each other in respect of social and religion difference?	4.508	0.000	4.682	0.000	4.600	0.001	4.527	0.000	4.54	0.0000				
	Do you encourage Women's involvement in your occupation?	4.700	0.000	4.682	0.000	4.700	0.000	4.700	0.000	4.70	0.0000				
Economic Condition	Is it necessary to take loan for fishing?	4.392	0.000	4.318	0.069	4.400	0.028	4.373	0.000	4.38	0.0000	4.4760	.002		
	Can you reimburse the loan with due conditions?	4.367	0.000	4.500	0.002	4.500	0.004	4.282	0.001	4.35	0.0000				
	From where generally take loan for fishing purpose?	4.692	0.000	4.682	0.000	4.700	0.000	4.709	0.000	4.70	0.0000				
	Which Organization /Institution you prefer to take loan, why?	4.617	0.000	4.727	0.000	4.650	0.000	4.500	0.000	4.58	0.0000				
	How you overcome your financial crisis in off season?	4.367	0.000	4.455	0.005	4.450	0.009	4.345	0.000	4.37	0.0000				
Present Occupational Satisfaction	Are you satisfied with present fishing occupation?	4.767	0.000	4.591	0.000	4.800	0.000	4.755	0.000	4.75	0.0000	4.6420	.001		
	Do you want to change your present occupation? Why?	4.767	0.000	4.818	0.000	4.800	0.000	4.800	0.000	4.79	0.0000				
	Is there any scope to change your occupation in the near by area?	4.675	0.000	4.682	0.000	4.650	0.000	4.673	0.000	4.67	0.0000				
	What are the comments of your family member regarding your occupation?	4.425	0.000	4.545	0.002	4.450	0.016	4.427	0.000	4.44	0.0000				
	Do you and your family member prefer/want to switch other income generating activities as your primary occupation?	4.542	0.000	4.682	0.000	4.600	0.000	4.545	0.000	4.56	0.0000				

Table 3: Frequency (%) of the total respondent for each attributes.

Attributes	1=Perception is Poorest	2=Perception is Poorer	3=Perception is Moderate	4=Perception is Higher	5=Perception is Highest	total %
What is the Present management system from government?	1.471	1.471	4.044	34.559	58.456	100
Are you satisfied with present management system?	0.000	0.735	9.191	19.485	70.588	100
Do Govt. and NGO help you for management options?	2.206	7.353	18.015	19.118	53.309	100
Do you need to pay tax for using fishing area and landing center?	0.000	7.353	11.029	20.588	61.029	100

Do you encouraged to practice community management system for ESBN fishery?	0.000	0.368	1.103	8.824	89.706	100
Is there any seasonal variation in species composition?	0.000	2.574	21.691	34.559	41.176	100
Does the species composition affect your livelihood?	0.000	3.676	16.912	39.706	39.706	100
Species composition is increasing /decreasing through time series?	0.000	4.779	19.485	20.956	54.779	100
Total catch is increasing/ decreasing then the past?	0.000	1.471	16.176	19.853	62.500	100
Which species you should prefer for commercial purpose?	6.618	14.338	25.368	18.750	34.926	100
What is the religious structure of the society?	44.100	0.000	0.000	0.000	55.900	100
Dose your religion effect your occupation?	0.000	0.000	9.559	24.632	65.809	100
How compact is your social bondage?	0.000	0.000	4.044	24.265	71.691	100
Do you share your cultural tradition with each other in respect of social and religion difference?	0.000	0.000	13.971	18.382	67.647	100
Do you encourage Women's involvement in your occupation?	0.000	0.000	5.515	19.118	75.368	100
Is it necessary to take loan for fishing?	0.000	0.000	16.544	29.044	54.412	100
Can you reimburse the loan with due conditions?	0.000	0.000	21.324	22.059	56.618	100
From where generally take loan for fishing purpose?	0.000	0.000	5.147	19.853	75.000	100
Which Organization /Institution you prefer to take loan, why?	0.000	4.779	6.618	14.338	74.265	100
How you overcome your financial crisis in off season?	0.000	0.000	11.029	40.809	48.162	100
Are you satisfied with present fishing occupation?	0.000	0.000	0.735	23.529	75.735	100
Do you want to change your present occupation? Why?	0.000	0.000	0.000	21.324	78.676	100
Is there any scope to change your occupation in the near by area?	0.000	0.000	0.000	32.721	67.279	100
What are the comments of your family member regarding your occupation?	0.000	0.000	16.544	23.162	60.294	100
Do you and your family member prefer/want to switch other income generating activities as your primary occupation?	0.000	0.000	7.353	29.412	63.235	100

Table 4: Total variance explained.

Component	Initial Eigenvalues		
	Total	**% of Variance**	**Cumulative %**
1	4.36	18.2	18.2
2	2.36	9.82	28
3	2.27	9.46	37.4
4	1.7	7.06	44.5
5	1.62	6.73	51.2
6	1.24	5.18	56.4
7	1.07	4.46	60.9
8	0.99	4.1	65
9	0.92	3.85	68.8
10	0.83	3.45	72.3
11	0.81	3.38	75.7
12	0.73	3.03	78.7
13	0.66	2.76	81.4
14	0.61	2.54	84
15	0.54	2.26	86.2
16	0.53	2.22	88.5
17	0.5	2.07	90.5
18	0.46	1.92	92.4
19	0.44	1.85	94.3
20	0.37	1.53	95.8
21	0.29	1.2	97
22	0.26	1.07	98.1
23	0.25	1.05	99.2
24	0.2	0.85	100

Table 5: Rotated Component Matrix [a] (loading criteria. 0.6)

Attributes	Component						
	1	2	3	4	5	6	7
What is the Present management system from government?	0.040	0.063	0.164	**0.691**	-0.009	0.241	0.156
Are you satisfied with present management system?	0.049	0.017	-0.011	**0.637**	0.167	0.141	0.165
Do Govt. and NGO help you for management options?	0.197	0.027	-0.011	0.400	-0.034	0.450	0.354
Do you need to pay tax for using fishing area and landing center?	0.041	-0.064	0.052	0.110	0.103	0.154	**0.812**
Do you encouraged to practice community management system for ESBN fishery?	0.108	0.128	0.171	**0.749**	0.128	-0.096	-0.172
Is there any seasonal variation in species composition?	**0.852**	0.046	0.082	-0.079	0.102	0.117	0.051
Does the species composition affect your livelihood?	**0.785**	0.036	-0.027	0.093	-0.058	0.066	0.025
Species composition is increasing/decreasing through time series?	**0.742**	0.077	0.005	0.098	0.240	0.066	0.008
Total catch is increasing/ decreasing then the past?	**0.738**	0.111	0.002	0.230	-0.013	-0.070	-0.009
Which species you should prefer for commercial purpose?	**0.753**	0.046	0.180	-0.042	0.035	0.092	0.020
Dose your religion effect your occupation?	0.055	-0.056	-0.011	0.055	0.634	-0.001	0.126
How compact is your social bondage?	0.019	0.075	**0.840**	0.099	0.087	0.030	0.020
Do you share your cultural tradition with each other in respect of social and religion difference?	0.049	0.022	**0.815**	-0.084	0.081	0.020	0.306
Do you encourage Women's involvement in your occupation?	0.080	-0.017	**0.734**	0.326	-0.003	-0.053	-0.148
Is it necessary to take loan for fishing?	0.104	**0.716**	0.068	0.255	-0.220	-0.177	0.129
Can you reimburse the loan with due conditions?	0.050	**0.638**	0.013	0.121	-0.231	0.075	0.055
From where generally take loan for fishing purpose?	0.008	**0.761**	0.157	0.061	-0.014	0.278	-0.166
Which Organization /Institution you prefer to take loan, why?	0.045	**0.730**	-0.027	-0.162	0.184	0.125	-0.026
How you overcome your financial crisis in off season?	0.151	**0.690**	-0.009	0.018	0.276	-0.176	-0.068
Are you satisfied with present fishing occupation?	0.099	-0.057	0.136	0.273	0.475	-0.100	-0.095
Do you want to change your present occupation? Why?	0.102	0.044	0.022	0.142	-0.005	**0.714**	0.154
Is there any scope to change your occupation in the near by area?	0.050	0.075	0.055	0.074	**0.650**	-0.122	0.415
What are the comments of your family member regarding your occupation?	0.071	0.116	0.039	-0.033	**0.660**	0.413	-0.261
Do you and your family member prefer/want to switch other income generating activities as your primary occupation?	0.157	0.114	0.431	0.067	-0.033	0.371	-0.164

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
[a] Rotation converged in 10 iterations.

Table 6: KMO and Bartlett's test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.707
Bartlett's Test of Sphericity	Approx. Chi-Square	1933.737
	d.f.	276
	Sig.	0.000