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Factors Affecting the Success of Fisheries Co-Management as Perceived by Guilan's Fishermen

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Abstract: This study was intended to draw the factors affecting the success of fisheries co-management as perceived by Guilan's fishers, Iran. A sample of 136 fishers was selected through multistage cluster sampling technique. To identify the effective factors to success fisheries co-management, a self-designed questionnaire was developed to gather data. For determining the validity of questionnaire, the face and content validity was used. Reliability for the instrument was estimated at 0.77. According to factor analysis, the effective factors for the success of fisheries co-management process were categorized into nine groups that those factors explained 67% of the total variance of the research variables. The results also indicated that Common goal, Sustainable fishing and Lack of bureaucracy had the most effects on the success of fisheries co-management, respectively.

Key words: Co-management, participation, fishers, factor analysis

INTRODUCTION

The current consensus of fisheries professionals' is that the fisheries industry and aquatic resources are under of various threats and risks because of overfishing and the destruction of aquatic habitat. However, other professionals believe that in addition to resources crisis, the fishing industry has faced a management crisis, which has resulted in organizational and institutional problems. In most developing countries fisheries resources are managed through the means of state management. This top-down, centralized approach to fisheries management, which emphasized the role of government in fisheries management, failed to protect fish stocks from over-exploitation (Hollup, 2000). In addition, this centralized approach has led to a lack of legitimacy (Nielsen and Vedsmand, 1997). Failures of top-down approaches to fisheries management have come under scrutiny and the concept of co-management has gained increasing purchase (Beem, 2007).

There has been a growing recognition that user-groups have to become more actively involved in fisheries management. Indeed, one of the most important differences in the area of agriculture in general and fisheries in particular, is that the users (i.e., the fishers) play vastly different roles. Consequently, in fisheries management, one cannot ignore the role of the fishermen or the users themselves play (Ghasemi, 1998). According to World Bank (2006), co-management refers to an arrangement through which government and resource users share the responsibility for managing fisheries.

Co-management can be defined as a dynamic partnership using the capacity and interest of user-groups complemented by the ability of the fisheries administration to provide enabling legislation (Nielsen and Vedsmand, 1997). In addition, Hollup (2000) believed that this approach emphasizes that recourse have to be involved in the management process and participate in regulatory decision-making, implementation and enforcement. This approach has grate advantages, too. Its advantage is that the fishers can influence the decisions made, while governments can ensure that long-term management objectives are met. Participation in decision-making gains the support of the fishers, confers legitimacy on the regulations and fosters compliance, which may also reduce the costs of monitoring and surveillance (Schumann, 2007; Kuperan *et al.*, 2008; World Bank, 2006; Hollup, 2000). However, co-management is a means of building trust and empowering stakeholders to participate in the shared governance of fisheries (Beem, 2007; Jentoft, 2005; World Bank, 2006). Pomeroy *et al.* (2001) examined the conditions affecting the success of fisheries co-management in Asia. These conditions are reported in the three following levels:

- The supra community level
- Community level and
- Individual and household level

In following, they noted that none of the conditions exist in isolation, but each supports and links to another to make the complex process and arrangements for



Fig. 1: Site of study

co-management work. All of the parties (resource users, stakeholders, external agents and government) have different but mutually supportive roles to play in co-management.

The primary purpose of the present study was to identify the factors affecting the success of fisheries co-management as perceived by Guilan's fishermen, Iran. The specific objectives of this study were to: (1) describe the demographic profile of Guilan Province fishermen and (2) identify effective factors to attract fishermen participation in fisheries co-management.

MATERIALS AND METHODS

The study was conducted in the Province of Guilan, located in the north part of Iran and southern part of Caspian Sea (Fig. 1). Coastal fishermen in Guilan Province, Iran were the target population for this study. The 136 of fishers were selected from fisheries cooperatives through multistage cluster sampling. The research design for this study was a survey design. From a review of the literature, the researchers developed an instrument to collect data.

The survey was divided into two sections. The first section was designed to gather data on personal characteristics of fishermen, included age, years of experience, level of education, place of living, marital status, second job, religious and race. The second section was designed to gather data about fishermen perceptions with respect to the factors that would promote the fisheries co-management process. Respondents were asked to rate their viewpoints concerning these factors on a five point Likert-type scale: (5 = very much, 4 = much, 3 = moderate, 2 = low and 1 = very low). A panel of experts consisting of faculty members established content and

face validity. Questionnaire reliability was estimated by calculating Cronbach's alpha. Reliability for the instrument was estimated at 0.77. The data were collected between October 2005 and March, 2006. After gathering and encoding information from the questionnaires, data was obtained for analysis. Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS, 14). Beside descriptive statistics, factor analysis was employed for detailed analysis.

RESULTS AND DISCUSSION

The first objective was to describe the demographic profile of Guilan Province fishermen. The ages of the respondents ranged from 15 to 73. 14.7% of fishermen ($n = 20$) described themselves as illiterate. 33.1% of respondents ($n = 45$) had some elementary education. Approximately 26% of fishermen had middle school education and 22.8% of them had high school education and 3.7% ($n = 5$) had academic education. More than 52.2% of respondents had less than 13 years of experience; however, 26.5% of respondents had more than 24 years of experience. 45.6% of the sample ($n = 62$) lived in urban areas. The remaining 54.4% lived in rural areas. Approximately 73% of respondents were married. Thirty Two percent of respondents had managerial tasks and the remaining ($n = 104$) were fishermen. In seasons out of fishing (six months of year), nearly 40% of fishermen were unemployed, but 60% of fishermen had a second job such as fisheries industry, farming etc. In addition, the religions of 83% of the sample ($n = 113$) were Shiite and the remaining were Sunnite. 45.6% ($n = 62$) of fishermen were Gilak, 17.8% ($n = 24$) were Talesh and 36.8% were Azary (Table 1).

Table 1: Demographic characteristics of respondents

Features	Frequency	Percentage
Age group		
20 and low	11	8.1
21-30	34	25.0
31-40	27	19.9
41-50	33	24.3
51-60	19	14.0
61 and above	12	8.7
Education levels		
Illiterate	20	14.7
Primary school	45	33.1
Secondary school	35	25.7
High school	31	22.8
Academic	5	3.7
Years of experience		
6 and low	51	37.5
7-12	20	14.7
13-18	11	8.1
19-24	18	13.2
25 and above	36	26.5
Second job		
Fisheries industry	12	8.8
Farming and husbandry	44	32.4
Other jobs	26	19.1
No second job	54	39.7
Race		
Gilak	62	45.6
Talesh	24	17.8
Azary	50	36.8

The second objective was to identify the effective factors to attract fishermen participation in fisheries co-management. Exploratory Principal Component Analysis (PCA) was conducted to summarize the variables of the research to a smaller quantity and to determine the factors affecting the success fisheries co-management and the obtained factors were subjected to VARIMAX rotation. PCA is a form of factor analysis, which first looks for a linear combination of variables that extracts maximum variance from variables and then identifies a second linear combination to explain the remaining variance, leading to orthogonal, or uncorrelated, factors (Rehman *et al.*, 2007). The value of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was 0.73. Nelson and Thompson (2005) reported that KMO values of 0.6 and above are required for good factor analysis. Using the eigenvalue greater than one rule, the PCA suggested the presence of nine factors, which accounted for 67.0% variance in scores. The nine factors extracted and named in this study follow: (1) Common goal, (2) Sustainable fishing, (3) Lack of bureaucracy, (4) Homogeneity, (5) Local dependency, (6) Participation in problem solving, (7) Legitimacy, (8) Professional fishery and (9) Economic (Table 2).

The first factor was called the Common goal factor. This factor had the most eigenvalue (2.63) among the other factors. Also this factor explained 9.7% of the total

variances of the variables. The clarity and simplicity of objectives helps steer the direction of co-management. The co-management process may involve multiple objectives and multiple implementation strategies (Pomeroy *et al.*, 2001). Access to insurance was the most important objective ($M = 4.66$) for fishers to participate in co-management process. Access to credits and loan and to extension-education courses were the other objectives that encouraged fishermen to involve in fisheries co-management process.

The second factor was called the Sustainable fishing. This factor that its eigenvalue was 2.48 explained 9.2% of the total variances of the variables. Sustainable fishing is a collective-action based process and participation is a pivotal element for the achievement of it. A necessary condition for sustainable fishing is that large numbers of fishermen must be motivated to use coordinated resource management. Achievement of this condition leads to promote fisheries co-management. Encouraging fishermen to use of engines with authorized capacity and standard fishing nets, observance of fishing bound, fishing time and season and propagation and releasing of under-sized (juvenile) by fishermen lead to sustainable fishing and accomplishment it, in turn, lead to enhance of fisheries co-management.

The third factor was called the Lack of bureaucracy. This factor that its eigenvalue was 2.33 explained 8.6% of the total variances of the variables. The lack of bureaucracy facilitate a vertical exchange of information in cooperatives, be enabling fishers to access higher levels of management.

ANOVA tests were used to determine if significant differences existed between factor scores of the effective factors to success fisheries co-management when grouped by selected attributes of respondents. Fishermen's view regarding the affective factors to success fisheries co-management differed significantly by fishermen's age for the factors Common goal ($F = 2.65$; $p \leq 0.05$), Lack of bureaucracy ($F = 3.77$; $p \leq 0.01$), Local dependency ($F = 2.78$; $p \leq 0.05$) and legitimacy ($F = 2.74$; $p \leq 0.05$). The findings indicated that the factor scores of the effective factors to promote fisheries co-management differed significantly when examined by their level of education for the factors Lack of bureaucracy ($F = 3.13$; $p \leq 0.05$), Local dependency ($F = 2.93$; $p \leq 0.05$) and Economic ($F = 2.82$, $p \leq 0.05$). In addition, there were not found any significant differences on factor scores when examine by respondents' race (Table 3). Both two factors Lack of bureaucracy and Local dependency were affected by respondents' age, level of education and years of experience.

Table 2: Results of factor analysis for effective factors to success fisheries co-management process and the variables of each factor

Effective factors to promote fisheries co-management	Mean±SD	Factor loading	Eigen values	Variance (%)	Cum (%)
Common goal			2.63	9.7	9.70
Access to extension-education courses	4.07±1.28	0.755			
Access to insurance	4.66±0.92	0.738			
Access to credits and loan	4.09±1.33	0.623			
Sustainable fishing			2.48	9.2	18.9
Proximity of cooperative office to fishing site	4.58±0.84	0.683			
Using engines with authorized capacity and standard fishing nets	4.54±0.99	0.633			
Observance of fishing time	4.44±1.04	0.624			
Observance of fishing season	4.55±0.88	0.606			
Observance of fishing bound	4.64±0.77	0.564			
Propagation and releasing of under-sized (juvenile) fish	4.48±1.025	0.520			
Lack of bureaucracy			2.33	8.6	27.5
Ease access to fishery cooperative head	4.54±0.87	0.750			
Ease access to fishery syndicate head	4.68±0.84	0.683			
Voluntary membership	4.38±1.82	0.540			
Homogeneity			2.11	7.8	35.3
Homogeneity in dialect	3.90±1.35	0.901			
Homogeneity in ethnicity	3.85±1.36	0.832			
Homogeneity in religion	3.83±1.48	0.648			
Local dependency			2.11	7.8	43.1
Proximity to family	3.88±1.36	0.810			
Time span of residence in area	3.97±1.30	0.799			
Ownership of land and house in area	4.04±1.30	0.677			
Participation in problem solving			2.07	7.7	50.8
Participation for identifying problem	4.35±0.97	0.841			
Participation for solving problem	4.35±1.047	0.802			
Legitimacy			1.81	6.7	57.5
Participation in decision-making	4.10±1.19	0.789			
Acceptability and respect to fishers' decisions	4.10±0.713	0.526			
Knowing regarding balance sheet	4.60±0.792	0.511			
Nonintervention of government*	2.60±1.61	0.454			
Accountability	4.47±1.02	0.434			
Professional fishery			1.36	5.03	62.5
Fishery as an original job for fishers	4.29±1.13	0.726			
Economic			1.22	4.5	67.0
Earning more interest and benefit	4.38±1.01	0.734			

Table 3: F-test results to compare individual effective factors on the success of co-management by fishers' demographic characteristics

Effective factors	F-values				
	Age	Level of education	Years of experience	Second job	Race
Common goal	2.65*	0.150	0.46	5.85**	2.72
Sustainable fishing	2.13	0.501	0.37	0.46	1.85
Lack of bureaucracy	3.77**	3.130*	5.12**	0.19	0.69
Homogeneity	1.06	0.460	0.32	0.61	0.95
Local dependency	2.78*	2.930*	2.56*	0.11	0.93
Participation in problem solving	0.61	0.260	0.82	0.51	2.60
Legitimacy	2.74*	0.630	1.50	0.58	0.86
Professional fishery	0.91	1.170	1.31	0.79	0.16
Economic	1.80	2.820*	0.14	3.70*	0.30

*p≤0.05, **p≤0.01

CONCLUSION

The fishing industry is in a process change. This change is indicated by modification in fisheries management decision-making processes in order to deal with the present lack of legitimacy in management system. Co-management is seen as a tool to handle changes in the fishing industry (Nielsen and Vedsmand, 1997). This study was intended to draw the factors affecting the

success of fisheries co-management as perceived by Guilan's fishers, Iran. An important finding of the study was that several factors dealing with the success of fisheries co-management process. Factors were extracted from PCA including the first factor were called Common goal and explained 9.7% of the total variance and were considered as the most effective factor. It is recommended that fisheries cooperative managers be considered to clarify objectives of community-based fishing. Based on

the findings of the present study access to different types of insurance and social security was the most important objective and motivator factor to attract fishermen's participation in the fisheries co-management process. In addition, access to credits and loans and to extension-education courses were the other most important factors in this area. The results also indicated that Sustainable fishing and Lack of bureaucracy was the second and third factors to promote fisheries co-management process, respectively. Sustainable fishing ensure the fishermen's livelihood and career, therefore participation in Sustainable fishing practices can be considered as a motivator toward co-management process. Finally, the Lack of bureaucracy facilitate a vertical exchange of information in cooperatives, be enabling fishers to access higher levels of management and contribution in decision-making process.

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