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## **Social Sustainability Assessment of Fishery Cooperatives in Guilan Province, Iran**

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**Abstract:** The main purpose of this study was to assess social sustainability of fishery cooperatives in Guilan Province, Iran. To achieve this purpose descriptive survey research was used. Twenty-one major fisheries (out of 58) in the Caspian Sea (Guilan Province) were identified for analysis. Based on RAPFISH technique, 10 attributes regarding social sustainability was used for this study. To assess social sustainability level, Morris Inequality Index was used. Obtained findings revealed that social sustainability of fisheries was ranging from a minimum of 17% to a maximum of 62%, so that Moj-e-Gol cooperative in Astara County and Jokandan cooperative in Talesh County had been allocated the least and the most social sustainability index, respectively. In addition, Bandar Anzali County had the best social sustainability situation among other counties and on the other hand, Astara county had the worst sustainability (unsustainable) situation.

**Key words:** Sustainability, fisheries, RAPFISH, cooperative, Guilan

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### **INTRODUCTION**

From ancient times, fishing has been a major source of food for humanity and a provider of employment and economic benefits to those engaged in this activity. However, with increased knowledge and the dynamic development of fisheries it was realized that aquatic resources, although renewable, are not infinite and need to be properly managed if their contribution to the nutritional, economic and social well-being of the growing world's population was to be sustained (FAO, 1999). There is a global consensus that capture fisheries face an environmental and socioeconomic crisis in many parts of the world (World Bank, 2006). To answer this crisis, sustainable fishery was emerged. Sustainability has evolved as a principle and process that ties socio-economic development with environmental management and conservation (Glaser and Diele, 2004; Adrianto *et al.*, 2005) and is underpinned by institutional reform. It emerged in the late 1980s with international reports such as Our Common Future that defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Potts, 2006). It worthy to note that sustainable development is a broad concept and fishing is one of the many activities that can contribute to sustainable development (Garcia *et al.*, 2000). Indeed, sustainability is a multi-dimensional concept that integrates economic, social and ecological dimensions (Murillas *et al.*, 2008). Fisheries management is increasingly seen to be as much about managing human behavior as about fish ecology, it means that fisheries is a multi-dimensional human activity. Nevertheless, this human dimension is so intertwined with the gear, vessels, markets, biological and economic sustainability, management, allocation and the rebuilding of depleted and collapsed

stocks, that the study of fisheries can be regarded as truly multi-disciplinary but traditional models were only rely on ecological dimension and occasionally on economic dimension. Considering to importance of social dimension of fishing activity (Adrianto *et al.*, 2005) that it is ignored in traditional models, the main purpose of this study was to analysis the social sustainability condition of fisheries cooperatives in Guilan Province. Social sustainability highlights on maintaining or enhancing societal welfare in fishery system without jeopardizing its economic and socio-cultural well-being, its cohesiveness and the long-term benefits that are relevant to human welfare (Liu *et al.*, 2005).

## MATERIALS AND METHODS

Guilan is located in the Northeastern part of Iran (Fig. 1) with the Caspian Sea to its North. The study represented descriptive survey research. Based on the information available during this research, 21 major fisheries (out of 58) in the Caspian Sea (Guilan Province) were identified for RAPFISH analysis. On the base of RAPFISH technique (Pitcher and Preikshot, 2001; Tesfamichael and Pitcher, 2006), 10 attributes regarding social sustainability was used for this study. The list of attributes, their definitions and scoring ranges in their respective evaluation fields are shown in Table 1. Each attribute was scored according to the information collected in field samplings (2009), direct observation, interviews to fishers, stakeholders and official information from public institutions.

For data analysis and assessment of social sustainability level, Morris Inequality Index was used. This index is among the newest formal model used in world. In Morris model using available information for each fishery, developmental conditions (sustainability) of each fishery according to each of selected index is identified and finally the mean of index sum using development index analyze method had been determined simply but in fitted way. Then it deals with to rank the fisheries. The calculation manner of this index is as follow:

$$Y_{ij} = \frac{X_{ij} - X_{ij(\min)}}{X_{ij(\max)} - X_{ij(\min)}} \times 100$$

where,  $X_{ij(\min)}$  and  $X_{ij(\max)}$  are the lowest and highest values the variable X can attain, respectively.  $Y_{ij}$  is Morris Inequality Index for each variable and  $X_{ij}$  is amount of variable in each fisheries.

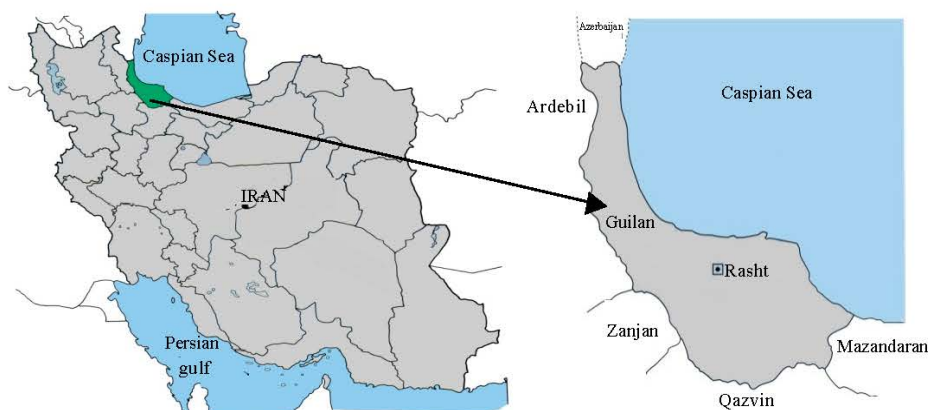


Fig. 1: Site of study

Table 1: List of the social attributes used in this analysis, showing the 'good/sustainable' and bad/unsustainable scores and definitions

Attributes	Sustainable	Unsustainable	Notes
Socialization of fishing	2	0	Fishers work as: individuals (0); families (1); community groups/cooperatives (2)
New entrants into the fishery/growth	4	0	Growth over past 10 years: almost fix (4); <10% (3); 10–20% (2); 20–30% (1); >30% (0)
Fishing sector	2	0	Households in fishing in the community: few <10% (2); some 10–30% (1); many >30% (0)
Environmental knowledge	2	0	Level of knowledge about the fishery resource and its ecosystem and environment none (0); some (1); lots (2)
Education level	2	0	Education level compared to population average: below (0); at (1); above (2)
Conflict status	2	0	Level of conflict with other sectors: none (2); some (1); lots (0)
Fisher influence	3	0	Strength of direct fishers influence on actual fishery regulations: almost none (0); some (1); lots (2)
Fishing income	2	0	Fishing income as percentage of total family income: <50% (0); 50-80% (1); >80% (2)
Kin participation	4	0	Do kin sell and/or process fish? None (0); very few relatives (1-2 people) (1); a few relatives (2); some relatives (3); many kin (4)
Insurance	2	0	Do fishers under cover of full insurance? No(0); only 6 months of year (1); full insurance (2)

Adapted from Tesfamichael and Pitcher (2006) and Pitcher and Preikshot (2001)

The important point in this model is that the applied indexes must be homodirection. The main developmental index may calculate through this formula:

$$DI = \frac{\sum_{i=1}^n Y_{ij}}{n}$$

where, n is the number of the studied indexes and DI is the main developmental index. Morris Inequality Index range between 0 and 100 where it is closer to 100, the more is development level. In addition, for further analysis, descriptive statistics like frequency, percentage, mean and standard deviation was used.

## RESULTS

For analyzing social sustainability dimension of fisheries, 10 attributes were studied. Among them, 2 attributes of Socialization of fishing and Insurance were similar in all of 21 fisheries so that in each 21 fisheries, fishing activities take place in social groups (cooperatives). In addition, in studied cooperatives, fishers were under the social security insurance only in 6 month (October-March) and they had not enjoyed from the benefits of health insurance and completed insurance.

One of the investigated attributes in this study was the increasing number of fishers and other engaged people to fishery activities over past 10 years, which examined as new entrants into the fishery/growth. According to Table 2, the results indicated that in the most cooperatives (76.2%), the number of fishers almost had been remained fix over past 10 years. We can see 20 to 30% increase of fishers' number and other involved people only in 2 fisheries. Findings show that in the most fisheries (95.2%) more than 30% of households in community were in fishing activity. In 19 fisheries, fishers had slightly (some) knowledge and information about the fishery resource and its ecosystem and environment.

Table 2: Summary of social sustainability attributes

Attributes	Frequency	Percentage
<b>Socialization of fishing</b>		
Individuals	0	0
Families	0	0
Community groups/cooperatives	21	100
<b>New entrants into the fishery</b>		
Almost fix	16	76.2
<10%	2	9.5
10-20%	1	4.8
20-30%	2	9.5
>30%	0	0
<b>Fishing sector</b>		
Few <10%	1	4.8
Some 10-30%	0	0
Many >30%	20	95.2
<b>Environmental knowledge</b>		
None	0	0
Some	19	90.5
lots	2	9.5
<b>Education level</b>		
Below	15	71.4
At	6	28.6
Above	0	0
<b>Conflict status</b>		
None	4	19
Some	16	76.2
Lots	1	4.8
<b>Fisher influence</b>		
Almost none	13	62
Some	4	19
Lots	4	19
<b>Fishing income</b>		
<50%	15	71.4
50-80%	6	28.6
>80%	0	0
<b>Kin participation</b>		
None	4	19
Very few relatives (1-2 people)	5	23.8
A few relatives	10	47.6
Some relatives	2	9.5
Many kin	0	0
<b>Insurance</b>		
No	0	0
Only 6 months of year	21	100
Full insurance	0	0

Unfortunately, only in 9.5% (n = 2) of fisheries cooperatives, fishers had lots information in this regard. Also, the education level of the fishers in 71.4% of cooperatives were lower than in comparing to the other people of community and in 6 cooperatives, fishers have equal education level with the other people. The results revealed that there were not any kind of conflicts between the fishers and between the fishers with the other sectors in 4 fisheries but, there were some conflicts in 16 fisheries and only in one case, the conflict level was high. The strength of direct fishers influence on actual fishery regulations was another attributes of social sustainability dimension that studied in this research. Results indicated that in 13 fisheries, fishers believed that they do not have any influence on fisheries management and in 4 cooperatives, the influencing level was at the moderate (there were some influence) and in remains was at high level. On the base of the findings in 71.4% (n=15) of fisheries, fishing activity were only form less than 50% of total family income and in 28.6%

Table 3: The social sustainability levels of Guilan fisheries cooperatives

Level of social sustainability	Fisheries cooperatives
Sustainable (80-100)	---
Slightly sustainable (60-79)	Isargaran (60), Jokandan (62)
Moderate (40-59)	Bashman (50), Khazar (50), Rajaee (50), Nobakht (58), Imam Khomeyni (40), Koolak (40)
Slightly unsustainable (20-39)	Ghazian (31), Shohada-e-Kalachay (31), Shiroodi (33), Ansari (33), Shohada-e-Anzali (33), 15 Esfand (35), Keshavarz (27), 22 Aban (23), Eslami (23), Azadegan (23), Omid (23)
Unsustainable (0-19)	Moj-e-Gol (17) Beheshti (19)

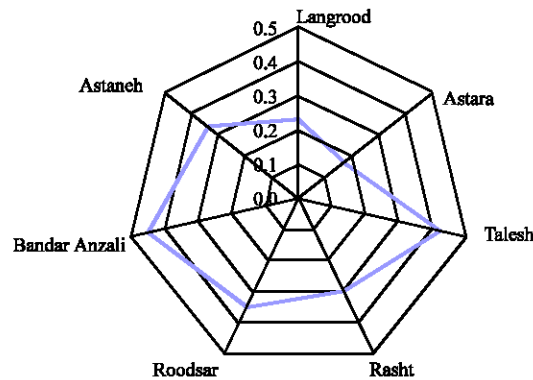


Fig. 2: Social sustainability level of fisheries in Guilan's counties

this range from 50 to 80% of family income. It was not reported more than 80% income from fishing in any of fisheries cooperatives. Kin participation was the other studied attributes in social sustainability. The attributes were examined with a question Do kin sell and/or process fish. In this attribute, Kin participation was rated in less level in 47.6% of fisheries. It was not seen any participation from family members in selling and/or processing fish in 4 cooperatives and only 2 cooperatives were in the high range of participation (Table 2).

To assess social sustainability level, Morris Inequality Index was used. The results from Morris Inequality Index indicated that social sustainability of fisheries which had been estimated based on 8 attributes (because two attributes of socialization of fishing and insurance were similar in all of 21 fisheries, only 8 attributes was used for Morris Inequality Index), was ranging from a minimum of 17% to a maximum of 62%, so that Moj-e-Gol cooperative in Astara county and Jokandan cooperative in Talesh county had been allocated the least and the most social sustainability index, respectively.

According to development coefficient (social sustainability), fisheries cooperatives were classified to five levels: sustainable (80-100), slightly sustainable (60-79), moderate (40-59), slightly unsustainable (20-39) and unsustainable (0-19). Table 3 shows the social sustainability levels of Guilan fisheries cooperatives.

For comparing social sustainability level of fisheries in Guilan's counties, the average of social sustainability coefficient for each county was calculated which its result had been indicated in the Fig. 2.

As in Fig. 2, Bandar Anzali county relatively had the most social sustainability situation among other counties (moderate level) and on the other hand, Astara county had the least sustainability (unsustainable) situation.

## **DISCUSSION**

According to the result, in all studied fisheries, fishing activities take place as fishery cooperative which imply the sustainability and optimal situation of the studied counties in terms of this index. This finding is opposite to Tesfamichael and Pitcher (2006)'s study on multidisciplinary evaluation of the sustainability of Red Sea fisheries using Rapfish but support Baeta *et al.* (2005) findings. The main reason for presence fishing activity as cooperative is the force of government to prohibition net fishing and obligatory membership of fishers in cooperatives. Of course, many people embark to catch as illegal fishers in side of cooperatives. Also, having insurance facilities index was similar in all fisheries so that they are under the insurance only 6 month and they are not under the healthy, pension and complementary insurance. Lacking full coverage of insurance is an old problem of the fishers in cooperatives. The studied counties were at moderate sustainability level in terms of this attribute. Among the other social sustainability index, entering new fishers to fishery sector had the best optimal situation so that the increasing rate of fishers number and engaged people in fishing activities over past 10 years had been remind greatly fixed or had been very low growth. Maybe the reason of this is increasing number of cooperatives over 90<sub>s</sub> decade (issuing permission more than catch capacity) and with starting of 2000, forming trend of this cooperative reduced for economical problems from unprincipled exploitation and making loss in cooperatives and consequently less people attracted to this profession. Social conflicts attribute is one of the indexes that implying moderate sustainability situation so in more fisheries the conflict status between fishers and also fishers and other sectors is in moderate level. The main conflict of the fishers member of cooperatives is with illegal fishers who catching illegally in the domain of cooperatives. The other studied attributes in social sustainability were in bad/unsustainable situation, which among them, it could point out to fishing sector attribute that implying there are fishers in more than 30% of the households in the community. This condition indicate social unsustainability/bad situation in Guilan. The main reason for this may lacking alternative and suitable employment opportunities in region, which sometimes this is the only employment choice for them. Level of knowledge about the fishery resource and its ecosystem and environment is at unsustainable level that related to the low education level of the fishers. The results indicate that Guilan's counties do not have suitable situation in social sustainability indexes so that none of them are not in sustainable (good) or slightly sustainable mode. Bandar Anzali county comparing to the other counties is relatively in a more suitable situation in terms of social sustainability. Maybe, the reason for this issue is that the most fishers member of cooperatives are living in urban region and this issue lead Bandar Anzali County to set in a better situation comparing to other counties. The most unsustainable situation is related to Astara county. This county only has one fishery cooperative, which is located in rural region.

## **CONCLUSION**

Overall, it be concluded that Guilan's counties do not have favorable situation in social sustainability so that more than seventy percent of the counties (62% of cooperatives) are located in moderate and unsustainable conditions. With regard to this fact that fishing activity is a human and social behavior management in fish ecology and integrated to each other intensively, this lead to unsuitable social conditions as well as economic and environmental misuse. In order to improve fishery social condition, promotion of some factors such as fully insurance coverage, increasing households' income share from fishing

activities, influencing fishers on management process and co-management and promoting fishers environmental knowledge level and their education level are essential.

#### **ACKNOWLEDGMENT**

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