Iranian Journal of Fisheries Sciences 19(6) 2985-3000 2020
DOI: 10.22092/ijfs.2020.122926

Research Article

Promoting governability in small-scale capture fisheries in the Persian Gulf: The case of Qeshm Island

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Received: April 2020 Accepted: August 2020

Abstract

The present study examines the fisheries governance status of small-scale capture fisheries in the northern Persian Gulf. Qeshm Island, which is selected as case study, plays a prominent role in fisheries in the Persian Gulf and territorial waters of the country. The research methodology included in-depth and semi-structured interviews with heads of fisheries cooperatives and fishers to deepen our understanding of the cultural and technical characteristics of local fisheries communities. Subsequently, data was drawn from 322 questionnaires, using a random sampling technique. The analyses indicate that fisheries co-management is at an interstitial situation, while the fishers are willing to cooperate with the government. A finding is also showed that literacy has a significant effect on fishers' willingness to cooperate with government. There was also a considerable conflict of interest among the fisheries communities in the study area, which makes the implementation of rules difficult. Small-scale fishing communities are generally in a hard-pressed situation, which affects how fishers operate. Our study aims to contribute to improving the governance and governability of small-scale capture fisheries in the region.

Keywords: Capture fisheries, Fisheries governance, Governability, Small-scale fisheries, Persian Gulf

[DOR: 20.1001.1.15622916.2020.19.6.36.8]

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Introduction

Fisheries are inherently diverse, complex, and dynamic systems (Jentoft, 2007b; Jentoft and Chuenpagdee, 2013). They involve several natural and social entities, such as ecosystems, habitats, fish species, communities, fishers, processors, technologies, civil society organizations, government agencies, policy-makers at various levels - all connected in complex ways, thus constituting an ecological, social and technological system. Ongoing interactions make the system dynamic and constantly changing, presenting a moving target for governance. As a result, it is difficult to understand how this fishery system works. This is also challenging from a governability perspective. Interactive governance (Kooiman *et al*., 2005; Chuenpagdee, 2011; Bavinck *et al*., 2013) suggests that to analyze the functioning and outcomes of fisheries governance a distinction between a system-to-be governed, the governing system, and the governing interactions should be made, but they should also be considered as mutually interacting systems.

Chuenpagdee and Jentoft (2009) stated that recognizing under what the conditions of socio-ecological fisheries systems function, including the interaction between components, is required for improving fisheries governability. However, because this concept is not just a scientific one but also a political issue, fisheries governance is challenging, requiring an inclusive governance process, representative of stakeholder interests, and participatory. Regarding to Rittel and Webber (1973), Chuenpagdee and Jentoft (2009) called fisheries and coastal governance a "wicked problem." They argued that fisheries problems are typically part of a bigger societal problem, and do not have an easy answer. Given the limitations of governability, governors must concentrate as much on what they want to avoid as well as what they want to accomplish under ideal circumstances. In other words, it is rational that instead of talking about goal maximization and perfect conditions, we need to talk about the system efficiency given its real status and the goals according to which they are governed. In our view, this is also what should guide the governance of small-scale fisheries in the Iranian zone of the Persian Gulf.

The Persian Gulf is located in the heart of the Middle East and separates the Arabian Peninsula from Iran. It is bordered by Iran, Iraq, Kuwait, Qatar, Bahrain, the United Arab Emirates (UAE) and Saudi Arabia (Fig. 1). The Persian Gulf fisheries methods are multi-gear (drift and fixed gill-net, trawl, wire trap called "gargoor", intertidal fixed stake net trap called "Moshta" etc.), and mostly artisanal (Paighambari and Daliri, 2012; Al-Abdulrazzak *et al*., 2015; Hosseini *et al*., 2015; Daliri *et al*., 2016).

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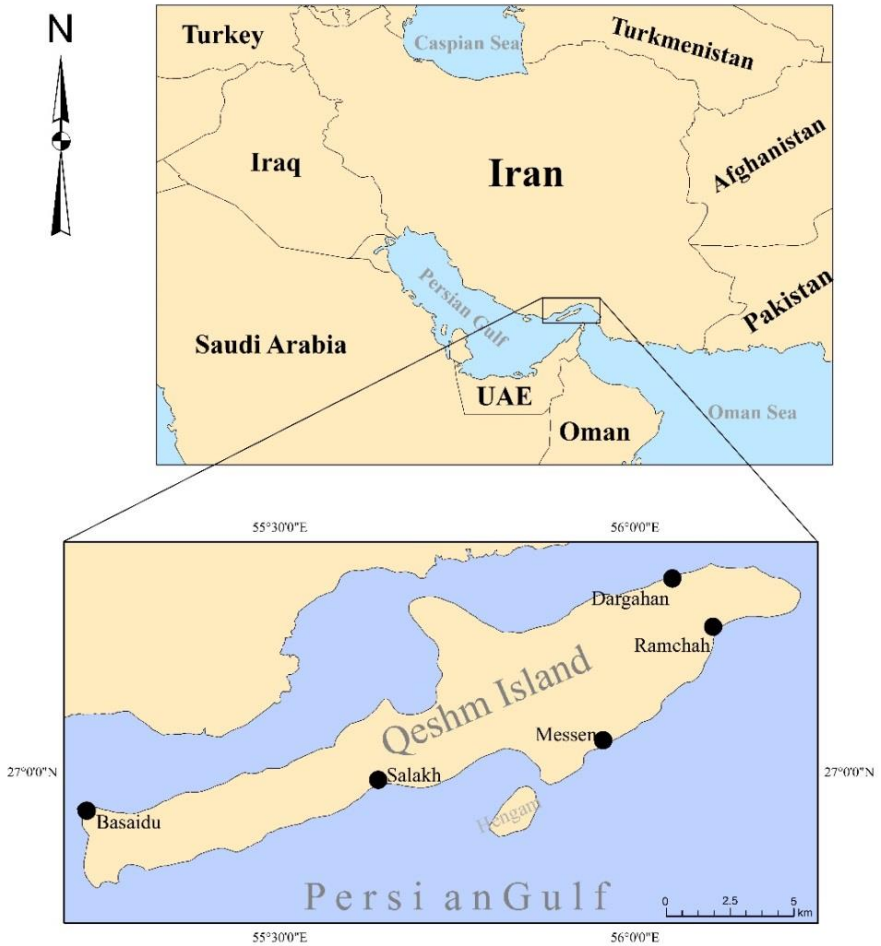

Figure 1: Location of the study area in the Persian Gulf.

Besides that, fisheries have an important role in food security and represent cultural heritage as ancestral traditions of the Persian Gulf's coastal population (Daliri *et al*., 2016). While the published statistics by FAO (2018) and IFO (2018) indicates that fish consumption in Iran is below the global average, increasing consumption has been adopted as a major policy goal by the Iranian government. However, fish is a main food source for 10 percent of Iran's population (7.5 million people) who are inhabitants of the Iranian coastal zones of the Persian Gulf (Statistical Center of Iran, 2018).

A report of the United Nations Food and Agriculture Organization (FAO) estimates that the marine catch potential in the Persian Gulf is 550,000 tons annually (Sale *et al*., 2011). Al-Abdulrazzak *et al*. (2015) demonstrated that the Persian Gulf's total catches increased gradually from 196,237 tons in 1950 to a peak of 621,270 tons in 1997, and then dropped sharply to 381,678 tons in 2004, thereafter showing relative stability. Thus, fish stocks in the area are mostly full exploited or overfished (FAO, 2018). As a consequence, the sustainability of fisheries and the socio-economic

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stability of communities in the entire region are threatened. In addition, IUU (Illegal, Unreported and Unregulated) fishing, marine pollution and climate change are aggravating this situation (Naser, 2013; Daliri *et al*., 2015; Daliri *et al*., 2017; Naji *et al*., 2017; Sharifinia *et al*., 2018; Sharifinia *et al*., 2019; Ashraf Vaghefi *et al*., 2019). Considering this situation, lack of data on fisheries governance, particularly in the small-scale sector, is a serious challenge, and neighboring the Persian Gulf countries have to improve he efficiency and effectiveness of governing systems and practices in order to secure the viability and sustainability of this sector and the local communities who rely on it. Therefore, the present study attempts to assess the governance in small-scale capture fisheries in the Persian Gulf. The study focused on finding the answer to the question of what are the "wicked" problems and characteristics of fisheries governance in the Persian Gulf region. The study concentrated on the harvesting stage of the fish supply chain.

Materials and methods

Study area

Of the Persian Gulf countries, the Islamic Republic of Iran has the largest fisheries catch amount. In 2017, total landings here were 691,174 tons. Marine fisheries in Iranian Persian Gulf waters are both small-scale and large-scale (industrial-style trawlers). There are 125 industrial vessels and 10,368 artisanal vessels (3135 wooden vessels and 7233 outboard-powered small boats) active in southern Iran's commercial fishing sector. Industrial fleets are mostly fishing in the Oman Sea and open seas. Also, a number of 131,330 licensed fishers are organized in 169 fisheries cooperatives in the northern area of the Persian Gulf (IFO, 2018).

The Hormozgan province, with 1000 km (620 miles) of coastline, borders the northern part of the Persian Gulf and the Oman Sea. During the last decade, the Hormozgan province accounted for more than 50 percent of total landings in Iranian waters of the Persian Gulf and had the largest fishery of the region (Daliri *et al*., 2016). Qeshm Island is one of the islands in the Persian Gulf as the biggest one and has an especially important role in terms of fisheries and tourism. According to Aalizade and Oliyaee (2018), 37% of the total marine catch, and in particular 77% of small-pelagic fishes in Hormozgan province are caught by more than 1000 artisanal fishers in Qeshm Island. There are 12 active fisheries cooperatives in the Island. Those with the highest membership were selected for the present study, namely Basaidu, Salakh, Messen, Ramchah, and Dargahan. The cooperatives are located in the fishing villages, except Dargahan which is a coastal city in the central district of Qeshm county. Although these villages' economies are based on catching fish and harvesting seafood,

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trade has a greater impact on Dargahan people's livelihoods.

Methodology

The study covers a wide range of fishers using different fishing methods, and thus displays a cultural and technical heterogeneity. The research project was carried out in two phases. First, a total of 36 in-depth and semi-structured interviews were conducted with key informants, such as head of fisheries cooperatives and fishers experienced in using different fishing methods. These informants were selected non-randomly (Hofstede *et al*., 1990; Ayres, 2008; Daliri *et al*., 2016). All interviews were conducted face to face and each one lasted between 60 to 90 min. Interviews were audio-recorded and then reviewed in several iterations to find hidden information (Charmaz, 2011). All interviews had two parts: the first part included specifically targeted questions whereas the second was an open discussion. The main questions were:

1. How efficient are the existing fisheries law and regulations?
2. Does the government listen to you when making decisions?
3. Would fishers like to participate in government programs, even when they do not benefit from them in the short term?
4. Are there conflicts of interest among the local communities regarding the fishery?
5. What is your opinion about the future of capture fisheries in the area?

The interviews allowed researchers to learn more about local communities and issues to be included in the questionnaire for the subsequent survey. In the second phase, the questionnaire consisted of five-point Likert scale questions and two open-ended questions (Allen and Seaman, 2007). Likert response alternatives are widely used in various academic fields and disciplines, such as cultural studies, psychology, sociology, education, criminology, management, etc. (Beaudreault and Miller, 2011; Diker *et al*., 2011; Boone and Boone, 2012). Each question was scored on a scale of 1 to 5; 1 to 2 represent "very high" and "high" scores, 3 as "moderate", and 4 to 5 were considered as "low" and "very low" scores (Likert, 1932). The reliability of the questionnaire was tested by a reliability test (Cronbach's alpha: 0.742). The adequacy of the sample size was also determined by Cochran's sample size formula:

$$n = \frac{\frac{z^2 pq}{d^2}}{\left(1 + \frac{1}{N}\left(\frac{Z^2 pq}{d^2} - 1\right)\right)} \qquad (1)$$

where n is the sample size, Z is the value for the selected alpha level (α=0.05), p is the estimated proportion of an attribute that is present in the population, q is 1-p, pq is the estimate of variance and d is the acceptable margin of error for proportion being estimated or the confidence interval (Cochran, 2007).

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Data for the study was drawn from 322 questionnaires completed by voluntary participants (artisanal fishers) between November 2017 and July 2018. Collected quantitative data were analyzed using SPSS package software. Wilcoxon signed-rank test was used to compare the responses with mid-point (moderate situation=3), and the impact of literacy level and age on target responses were assessed by Kendall's tau coefficient (Maurice and Dickinson, 1990):

$$\tau = \frac{(number\ of\ concordant\ pairs) - (number\ of\ discordant\ pairs)}{{}^{1}/_{2}\, n(n-1)} \qquad (2)$$

where τ is the Kendall's tau coefficient and falls between -1 and +1.

Results

Three hundred and twenty-two questionnaires were completed. The interviewees were dominantly full-time fishers (almost 90%), and that altogether had elementary (41%), middle school (30%), high school (21%), diploma (5%) and higher (2%) literacy levels. Sixty-six percent of the participants were aged between 25 to 45 years of age. A summary of the fishing community characteristics is presented in Table 1. Table 2 shows the summarized responses to targeted questions. According to the fishers' responses, fisheries co-management in the region is at an intermediate level (MS=3.93, p>0.05), except the Messen region which is too low approximately (MS=4.31, p<0.05). However, the fishers were also willing to cooperate with the government. Except in Messen and Salakh, local communities were relatively satisfied with the fisheries cooperatives services (MS=2.49, p<0.05). While the fishers in Dargahan and Messen believed that the fishers in these regions are noncompliant, there is a high level of conflict of interest among the local fisheries communities in Qeshm. They complained that most of the fishers, particularly in Messen and Salakh, do not comply with the rules regarding fishery closure periods. Moreover, those who catch pelagic fishes, such as Indian mackerel, by gill-net, complained that small boats purse seiners have taken the bread out of their mouths. They argued that these boats have reduced their catch through fishing sardines and anchovies, which are a food source for other fishes. Hence, the gillnet fishers unanimously believed in the need to lessens the limits on the closed season for sardine and anchovy fishing.

All participants identified that anthropogenic activities, such as pollution and increased fishing effort have reduced their catches.

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Table 1: Descriptive characteristics of interview participants for the Qeshm Island fisheries.

Features (%)		Local communities				
		Dargahan	Ramchah	Messen	Salakh	Basaidu
Fishing as the only source of income	-	97.62	90.0	98.04	91.11	86.0
Literacy	elementary	36.0	37.5	46.67	23.53	61.36
	middle school	40.0	30.0	16.67	41.14	22.73
	high school	24.0	25.0	13.33	35.29	9.09
	diploma	0.0	7.5	13.33	0.0	4.55
	higher	0.0	0.0	10.0	0.0	2.27
Age	< 25	6.12	21.95	23.33	1.96	34.78
	25-35	30.61	41.46	36.67	54.90	39.13
	35-45	42.86	14.63	23.33	27.45	19.57
	45-55	20.14	12.20	16.67	11.76	6.52
	> 55	0.0	9.76	0.0	3.92	0.0
Fishing gear types	gill-net	78.0	17.07	6.67	49.02	52.17
	purse-seine	0.0	73.17	93.33	23.53	0.0
	hook and line	22.0	9.76	0.0	13.73	45.65
	trap	0.0	0.0	0.0	13.73	2.17
Fishing vessel types	boat	62.0	97.56	96.67	64.71	39.13
	fiberglass dhow	32.0	2.44	3.33	35.29	56.52
	wooden dhow	6.0	0.0	0.0	0.0	4.35
Number of the employed fishers in vessels	< 3	24.0	9.52	3.33	5.88	2.17
	3-6	48.0	26.19	3.33	35.29	58.70
	6-10	26.0	35.71	53.33	23.53	26.09
	10-15	2.0	28.57	40.0	35.29	13.04
	> 15	0.0	0.0	0.0	0.0	0.0
Age of the employed fishers in vessels	< 20	4.52	5.95	10.30	11.03	7.14
	20-30	51.21	63.24	49.36	48.12	53.56
	30-40	38.31	28.11	28.76	32.54	36.04
	40-50	5.59	2.16	10.73	7.62	3.05
	> 50	0.42	0.54	0.86	0.69	0.21

However, they were willing to give up their short-term interests, except Messen fishers, to enhance sustainability in the region. For example, the fishers were mostly in favor of the temporary closure of fishing, which was implemented by the government in 2018. Also, there is a concern about the future (p<0.05). Table 3 presents the relationships between fisher's literacy and age with some effective factors in fisheries governance. There is a moderate positive correlation between fisher's literacy and their willingness to cooperate with government (τ=0.581) and their hope for the future of small-scale capture fisheries in the region (τ=0.630).

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Table 2: The summarized responses to target questions by participants.

	Target questions	Scores (95% CL)	Fisheries local communities					
			Dargahan	Ramchah	Messen	Salakh	Basaidu	MS
1	Co-management level in the area	Lower	3.37	2.69	3.94	2.58	2.95	3.16
		Mean	**3.72**	**3.09**	**4.31** *	**2.97**	**3.37**	**3.39**
		Upper	4.06	3.45	4.68	3.35	3.80	3.62
2	Willingness to cooperate with government	Lower	1.94	1.96	2.52	1.39	1.75	1.77
		Mean	**2.31** *	**2.34** *	**3.27**	**1.70** *	**2.04** *	**1.96** *
		Upper	2.68	2.73	3.83	2.01	2.33	2.16
3	Satisfaction with fisheries cooperatives' services	Lower	1.69	2.17	3.96	2.72	2.18	2.30
		Mean	**1.96** *	**2.59** *	**4.31** *	**3.00**	**2.46** *	**2.49** *
		Upper	2.24	3.01	4.66	3.28	2.74	2.67
4	Effectiveness of existing regulations	Lower	1.96	2.20	3.47	1.36	1.67	1.53
		Mean	**1.45** *	**2.66**	**3.86** *	**1.70** *	**2.12** *	**1.74** *
		Upper	1.73	3.11	4.25	2.04	2.58	1.95
5	Indigenous fishers' compliance	Lower	3.41	1.92	3.09	2.36	2.74	3.01
		Mean	**3.86** *	**2.37** *	**3.62** *	**2.70** *	**3.21**	**3.27**
		Upper	4.31	2.83	4.16	3.04	3.67	3.57
6	Ignoring the short-term individual interests to achieve sustainable fisheries	Lower	2.42	2.70	3.31	1.62	2.00	2.12
		Mean	**2.79**	**3.16**	**3.83** *	**1.80** *	**2.42** *	**2.33** *
		Upper	3.16	3.61	4.34	1.98	2.83	2.53
7	Anthropogenic pressures (pollution, fisheries, …) have negative impacts on marine ecosystem	Lower	1.00	1.20	1.92	1.07	1.44	1.24
		Mean	**1.02** *	**1.56** *	**2.42** *	**1.23** *	**1.75** *	**1.38** *
		Upper	1.35	1.93	2.91	1.39	2.06	1.51
8	Optimism regarding the future of small-scale fishing in the region	Lower	4.26	2.47	3.03	3.14	2.93	3.57
		Mean	**4.62** *	**2.94**	**3.52**	**3.60** *	**3.50**	**3.85** *
		Upper	4.99	3.40	4.00	4.05	4.07	4.14
9	Non-conflicts of interest among the fisheries local communities	Lower	3.75	2.60	3.77	2.61	2.99	3.15
		Mean	**4.14** *	**3.00**	**4.13** *	**3.00**	**3.46**	**3.42** *
		Upper	4.53	3.40	4.50	3.39	3.92	3.67

MS: Mean score, *****: Significant difference (at 5% confidence level) with midpoints.

There is also a weak negative correlation between the age of fishers and optimism to the future of small-scale fishing (τ=-0.264). However, older fishers are more willing to cooperate with the government (τ=0.140).

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Table 3: Kendall's rank correlation coefficients (α=0.01 level).

Variables		τ value
X variable	**Y variable**	
Literacy	Willingness to cooperate with government	0.581
	Ignoring the short-term individual interests to achieve sustainable fisheries	0.089
	Optimism regarding the future of small-scale fishing in the region	0.630
	Satisfaction on fisheries cooperatives services	0.021
Age	Willingness to cooperating with the government system	0.140
	Ignoring the short-term individual interests to achieve sustainable fisheries	0.029
	Optimism regarding the future of small-scale fishing in the region	-0.264
	Satisfaction on fisheries cooperatives services	0.022

Discussion

In many cases throughout the world, the failure of fisheries management can be traced to a lack of recognition of the social and cultural characteristics of target populations (Bailey and Jentoft, 1990). As Arbo *et al*. (2018) stated, marine social sciences have an important role in generating knowledge about the development of fisheries and the implications of fisheries policies on coastal communities. Studies show that the complexity, diversity, and dynamics of fisheries, and the involvement of a large number of stakeholders, make fisheries difficult to govern (Kooiman *et al*., 2005; Bavinck, 2018; Jentoft *et al*., 2018). Therefore, fisheries governance is one of the indispensable keys for fisheries management.

In 2014, the FAO's Committee on Fisheries (COFI) adopted the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SSF Guidelines), aiming to improve the socio-economic situation of fishers and fish workers (FAO, 2015). The guiding principle No. 13 of this instrument talks about improving fisheries governance and development of small-scale fisheries based on social and economic strategies and actions. In the present study, we reviewed the small-scale fisheries governability conditions in coastal area of the Iranian waters of the Persian Gulf. Assessing governability enables governor(s), including researchers to understand how a fisheries system works and how governance performance can improved (Chuenpagdee and Jentoft, 2009). The data analysis indicated that fisheries governance, particularly at the fish harvest stage, has strengths and weaknesses. For example, co-management is in an interstitial situation and should be given more policy focus.

Compared to more hierarchical forms of fisheries governance, co-management

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has some notable advantages (Hauck, 2009). Jagers *et al*. (2012) argued that co-management allows fishers to participate in decision-making, which creates more trust between the governors and fishers. This will consequently make fishers more positive about the need for having rules and more prone to follow them voluntarily. Carlsson and Berkes (2005) argued that using this approach to manage natural resources, such as fish stocks, in the current complex world will help management succeed. At its best, co-management can provide strong incentives for constructive collaboration between the fishers and the government. Thus, co-management systems may potentially enhance the governability of fisheries systems. However, Jentoft (2007a) noted that because of the wide range of stakeholders' interests, it is possible that some participants in co-management may attempt to exert their power to bend the rules in accordance with their particular interests.

Our data analysis showed that there is a positive correlation between literacy and the fisher's willingness to cooperate with government. In other words, education affects development of fisheries governance by enhancing governability. Daliri *et al*. (2016), in a study of small-scale fisheries in the northern Persian Gulf, highlighted the importance of education on prevalence of the IUU fishing. They argued that IUU fishing is linked to lack of knowledge about the existence of rules and what these rules are. The ability to read is, in other words, an essential minimum. They stated that due to the low literacy and economic problems, most fishers have a short-term perspective regarding their fishery and its fish stocks. Therefore, fishers tend to mistrust managers and decision-makers. Feeling economic pressure combined with lack of awareness of regulation is a strong impetus for illegal fishing. As William Shakespeare said, "strong reasons make strong actions".

As stated in the results section, we recognized that there is a considerable conflict of interest among the local fisheries communities in the study area, which makes the implementation of rules and regulations difficult. Competitive pressures on fish stocks adversely impact the sustainability of fisheries in the region. It is believed that this is rooted not only in economic problems but also in cultural conflicts. For example, some fishers mentioned that some local communities are generally against the laws, and not necessarily those just related to fishing. On the other hand, when the fishers are poor and feel that their livelihood is in jeopardy, they do what they have to do to put food on the table (Becker, 1968; Nielsen, 2003; Daliri *et al*., 2016). Rising inflation in the recent years put the people under pressure, and small-scale fishers are not exempted. It could even be argued that they are under more pressure, because they are known as one of the most vulnerable groups (Seeley and Allison, 2005; Béné and

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Friend, 2011; Islam, 2011; Mills *et al*., 2011).

Our findings also indicated that fishers do not have a strong hope for the future. Future hopes include different aspects of an individual's life, such as future education, occupation, marriage and family wellbeing, interpersonal relationships, leisure activities, wealth and self-related issues (Zhao *et al*., 2018). Elliot *et al*. (2013) argued that hope for the future consists of desirable prospects that people have or attempt to achieve. Analysis of participants' responses showed that the older fishers are less hopeful about the future than the youth. This may be related to experience of fish stocks declining over time. Although there is no existing literature that talks about fishers' expectations about the future, one would think that they are important for enhancing the willingness of people to engage in coastal governance and fisheries co-management. Losing hope for the future would lead to social apathy (Averill *et al*., 2012; Wood *et al*., 2013; Moradi and Safarian, 2018; Safarian, 2018). Social apathy refers to a lack of passion, excitement or even interest in social events (Thomas *et al*., 2009). In other words, apathy leads to little interest and sense of responsibility in social events or in cooperating with workmates or organizations. Effective governance requires that all parts of the fisheries system play their roles, but that is conditioned by fishers' hopes for the future.

As in so many other regions of the world, the small-scale fisheries sector plays a major economic, social and cultural role for the sustainability of coastal communities in the Persian Gulf of Iran. Numerous communities have fisheries as their main source of livelihood, but overfishing, pollution and other anthropogenic impacts put communities and fishing enterprises and families in jeopardy, to the extent that people are losing hope that the future will bring positive developments. This has led to social apathy within the fishing population, which affects their willingness to cooperate within and among communities and government for the betterment of their situation. Based on our findings, we believe that before one can expect to enhance the governability of fisheries these problems must be addressed. People must retrieve the expectation that their livelihoods will be more secure, and that their communities have a better chance of survival if they engage more actively. This is of course not a sufficient condition but a necessary one, and a place to start. There are many ways to bring back optimism that should be tried out. Governments should, for instance, demonstrate that they believe in the future of small-scale fisheries, and that they are willing to provide necessary support. Optimism is contagious: if government shows that it is serious about implementing the SSF guidelines in protecting the human rights of small-scale fisheries and empowering people in their local

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communities, fishers' outlooks are likely to improve. It is important to target the younger generation, as they are the future. Our study shows that they also have a more hopeful attitude as to what it will bring and are more willing to cooperate with government. Education is an important means of empowerment, and should be given priority. People need to know the rules and regulations they are subject to, and for that need to be able to read at a minimum. Collective action, also at the level of the community is also needed. This suggests that the governability of fisheries is a challenge, which is beyond fisheries *per se*. As the SSF guidelines emphasize, it requires a holistic approach, which targets rights, needs and capabilities of individuals, families and communities.

Qeshm Island has a notable number of fisheries cooperatives at the community level, and therefore a potential collective instrument for community development in a broad sense, which may help to build the skills and capacities needed for enhancing governability. The SSF guidelines underscore the need for building and supporting such organizations, which are often absent in small-scale fisheries globally. In Qeshm Island they already exist, and should therefore be a focal point in the implementation of the SSF guidelines. Supporting these organizations in whatever way they would need to realize their potential, like making them better equipped for taking on co-management and community development functions, including literacy programs would in our view be a sensible strategy. Now, the cooperatives contribute to implementation of fisheries regulations and legislations and they also manage some fishing ports, such as Salakh and Basaidu. But as mentioned above, there is conflict of interest among the local fisheries communities in the region and the cooperatives' performance. Therefore, attempting to reduce the conflicts should be considered priority of the cooperatives in order to improving the governability. However, how can they decline these conflicts is an open question.

Acknowledgments

The authors wish to thank the Research and Technology Office of the University of Hormozgan for their supports and funds. We are also grateful artisanal fishers for participating in this project research. We express sincere gratitude to Dr. Andrew Fischer (from Institute for Marine and Antarctic Studies, University of Tasmania, Launceston, Australia) for their valuable comments that helped in improving the manuscript.

References

Aalizade, I. and Oliyaee, F., 2018. The report of Annual marine fisheries in Hormozgan province in 2017,, Statistics Department, Hormozgan Fisheries Administration: 31P. 26P.

Al-Abdulrazzak, D., Zeller, D., Belhabib, D., Tesfamichael, D. and Pauly, D.,

[DOR: 20.1001.1.15622916.2020.19.6.36.8]

2015. Total marine fisheries catches in the Persian/Arabian Gulf from 1950 to 2010. *Regional Studies in Marine Science***,** 2, 28-34. DOI: 10.1016/j.rsma.2015.08.003.

Allen, I.E. and Seaman, C.A., 2007. Likert scales and data analyses. *Quality Progress***,** 40, 64-65.

Arbo, P., Knol, M., Linke, S. and Martin, K.S., 2018. The transformation of the oceans and the future of marine social science. *Maritime Studies***,** 17, 295. DOI: 10.1007/s40152-018-0117-5.

Ashraf Vaghefi, S., Keykhai, M., Jahanbakhshi, F., Sheikholeslami, J., Ahmadi, A., Yang, H.C. and Abbaspour, K., 2019. the future of extreme climate in Iran. *Nature*, 1464, 1-11. DOI: 10.1038/s41598-018-38071-8.

Averill, J.R., Catlin, G. and Chon, K.K., 2012. Rules of hope. Springer-Verlog New York Inc, 89P.

Ayres, L., 2008. Semi-structured interview. *The SAGE Encyclopedia of Qualitative Research Methods*, 811-813.

Bailey, C., Jentoft, S., 1990. Hard choices in fisheries development. *Marine policy***,** 14, 333-344. DOI: 10.1016/0308-597X(90)90055-V.

Bavinck, M., 2018. Legal pluralism, governance, and the dynamics of seafood supply chains—explorations from South Asia. *Maritime Studies*, 17, 275-284. DOI: 10.1007/s40152-018-0118-4.

Bavinck, M., Chuenpagdee, R., Jentoft, S. and Kooiman, J. 2013. Governability of Fisheries and Aquaculture: Theory and Applications**.** Springer, pp. 9-30.

Beaudreault, A.R. and Miller, L.E., 2011. Need for methamphetamine programming in Extension education. *Journal of Extension*, 49, n3.

Becker, G.S., 1968. Crime and punishment: An economic approach, *The economic dimensions of crime*. Springer, pp. 13-68.

Béné, C. and Friend, R.M., 2011. Poverty in small-scale fisheries: old issue, new analysis. *Progress in Development Studies*, 11, 119-144. DOI:10.1177/146499341001100203.

Boone, H.N. and Boone, D.A., 2012. Analyzing likert data. *Journal of extension*, 50, 1-5.

C**arlsson, L. and Berkes, F., 2005.** Co-management: concepts and methodological implications. *Journal of Environmental Management*, 75, 65-76. DOI: 10.1016/j.jenvman.2004.11.008.

Charmaz, K., 2011. Grounded theory methods in social justice research. *The Sage Handbook of Qualitative Research*, Sage Publications, Inc, pp. 359-380.

Chuenpagdee, R. and Jentoft, S., 2009. Governability assessment for fisheries and coastal systems: A reality check. *Human Ecology***,** 37, 109-120. DOI:10.1007/s10745-008-9212-3.

Chuenpagdee, R., 2011. Interactive governance for marine conservation: An illustration. B*ulletin of Marine Science*, 87,197–211. DOI: 10.5343/bms.2010.1061.

Cochran, W.G., 2007. Sampling techniques. John Wiley & Sons.

Daliri, M., Kamrani, E. and Paighambari, S.Y., 2015. Illegal shrimp fishing in Hormozgan inshore waters of the Persian Gulf. *The Egyptian Journal of Aquatic Research*, 41, 345-352. DOI: 10.1016/j.ejar.2015.11.007.

Daliri, M., Kamrani, E., Jentoft, S. and Paighambari, S.Y., 2016. Why is

[DOR: 20.1001.1.15622916.2020.19.6.36.8]

illegal fishing occurring in the Persian Gulf? A case study from the Hormozgan province of Iran. *Ocean & Coastal Management*, 120, 127-134. DOI: 10.1016/j.ocecoaman.2015.11.020.

Daliri, M., Jentoft, S. and Kamrani, E., 2017. Illegal, Unreported, and Unregulated Fisheries in the Hormuz Strait of Iran: How the Small-Scale Fisheries Guidelines Can Help, *The Small-Scale Fisheries Guidelines*. Springer, pp. 557-572.

Diker, A., Walters, L.M., Cunningham-Sabo, L. and Baker, S.S., 2011. Factors influencing adoption and implementation of cooking with kids, an experiential school-based nutrition education curriculum. *Journal of Extension*, 49, 13.

Elliot, A.J., Sedikides, C., Murayama, K., Tanaka, A., Thrash, T.M. and Mapes, R.R., 2013. " Cross-cultural generality and specificty in self-regulation: Avoidance personal goals and multiple aspects of well-being in the United States and Japan": Correction to Elliot *et al*.(2012).

FAO, 2015. Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. Food and Agriculture Organization of the United Nations Rome.

FAO, 2018. The state of world fisheries and aquaculture, meeting the sustainable development goals. Food and Agriculture Organization of the United Nations, Rome.

Hauck, M., 2009. Rethinking small-scale fisheries compliance: from criminal justice to social justice. University of Cape Town.

Hofstede, G., Neuijen, B., Ohayv, D.D. and Sanders, G., 1990. Measuring organizational cultures: A qualitative and quantitative study across twenty cases. *Administrative Science Quarterly*, 286-316. DOI: 10.2307/2393392.

Hosseini, S.A., Daliri, M., Raeisi, H., Paighambari, S.Y. and Kamrani, E., 2015. Destructive effects of small-scale shrimp trawl fisheries on by-catch fish assemblage in Hormozgan coastal waters (the northern Persian Gulf). *Journal of Fisheries***,** 68, 61-78 (in Persian).

IFO, 2018. Fisheries yearbook of Iran (2012 to 2017). Iran Fisheries Organization, 64P.

Islam, M.M., 2011. Living on the margin: the poverty-vulnerability nexus in the small-scale fisheries of Bangladesh, *Poverty mosaics: Realities and prospects in small-scale fisheries*. Springer, pp. 71-95.

Jagers, S.C., Berlin, D. and Jentoft, S., 2012. Why comply? Attitudes towards harvest regulations among Swedish fishers. *Marine Policy***,** 36, 969-976. DOI: 10.1016/j.marpol.2012.02.004.

Jentoft, S., 2007a. In the power of power: the understated aspect of fisheries and coastal management. *Human Organization*, 426-437. DOI: 44127420/ jstor.org/stable.

Jentoft, S., 2007b. Limits of governability: Institutional implications for fisheries and coastal governance. *Marine Policy*, 31, 360-370. DOI: 10.1016/j.marpol.2006.11.003.

Jentoft, S., Bavinck, M., Alonso-Población, E., Child, A., Diegues, A., Kalikoski, D., Kurien, J., McConney, P., Onyango, P. and Siar, S., 2018. Working together in small-scale fisheries: harnessing collective action for poverty eradication. *Maritime*

[DOR: 20.1001.1.15622916.2020.19.6.36.8]

Studies, 17, 1-12. DOI: 10.1007/s40152-018-0094-8.

Jentoft, S. and Chuenpagdee, R., 2013. Concerns and problems in fisheries and aquaculture–Exploring governability, *Governability of Fisheries and Aquaculture*. Springer, pp. 33-44.

Kooiman, J., Jentoft, S., Bavinck, M. and Pullin, R., 2005. Fish for life: interactive governance for fisheries. Amsterdam University Press.

Likert, R., 1932. A technique for the measurement of attitudes. Archives of psychology.

Maurice, K. and Dickinson, G.J., 1990. Rank correlation methods. London: Edward Arnold.

Mills, D., Béné, C., Ovie, S., Tafida, A., Sinaba, F., Kodio, A., Russell, A., Andrew, N., Morand, P. and Lemoalle, J., 2011. Vulnerability in African small-scale fishing communities. *Journal of International Development***,** 23, 308-313. DOI: 10.1002/jid.1638.

Moradi, A. and Safarian, M., 2018. The study of the relationships between social capital and hope for the future with youth asociolity (Case study: Kermanshah city, Iran). *Social Capital Management***,** 5, 410-385 (in Persian).

Naji, A., Esmaili, Z. and Khan, F.R., 2017. Plastic debris and microplastics along the beaches of the Strait of Hormuz, Persian Gulf. *Marine Pollution Bulletin*, 114, 1057-1062. DOI: 10.1016/j.marpolbul.2016.11.032.

Naser, H.A., 2013. Assessment and management of heavy metal pollution in the marine environment of the Arabian Gulf: a review. *Marine Pollution Bulletin*, 72, 6-13. DOI:10.1016/j.marpolbul.2013.04.030.

Nielsen, J.R., 2003. An analytical framework for studying: compliance and legitimacy in fisheries management. *Marine Policy*, 27, 425-432. DOI: 10.1016/S0308-597X(03)00022-8.

Paighambari, S.Y. and Daliri, M., 2012. The by-catch composition of shrimp trawl fisheries in Bushehr coastal waters, the northern Persian Gulf. *Journal of the Persian Gulf*, 3, 27-36.

Rittel, H. and Webber, M., 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4, 2, 155-169. DOI: 10.1007/BF01405730.

Safarian, M., 2018. Social factors affecting Iranian youth asociallity, *Social Sciences*. Ph D dissertation in Social Sciences. Islamic Azad University -Tehran North Branch, Tehran.

Sale, P.F., Feary, D.A., Burt, J.A., Bauman, A.G., Cavalcante, G.H., Drouillard, K.G., Kjerfve, B., Marquis, E., Trick, C.G. and Usseglio, P., 2011. The growing need for sustainable ecological management of marine communities of the Persian Gulf. *Ambio*, 40, 4-17. DOI: 10.1007/s13280-010-0092-6.

Seeley, J.A. and Allison, E.H., 2005. HIV/AIDS in fishing communities: challenges to delivering antiretroviral therapy to vulnerable groups. *AIDS care*, 17, 688-697. DOI:10.1080/09540120412331336698.

Sharifinia, M., Daliri, M. and Kamrani, E., 2019. Estuaries and Coastal Zones in the Northern Persian Gulf (Iran), *Coasts and Estuaries*. *Elsevier*, pp. 57-68.

Sharifinia, M., Taherizadeh, M., Namin, J.I. and Kamrani, E., 2018. Ecological risk assessment of trace metals in the surface sediments of the Persian Gulf and Gulf of Oman: evidence from

subtropical estuaries of the Iranian coastal waters. *Chemosphere*, 191, 485-493. DOI: 10.1016/j.chemosphere.2017.10.077.

Statistical Center of Iran, 2018. The results of the general census of population and housing in 2016. Presidency of the I.R.I, Plan and Budget Organization, 51P.

Thomas, E.F., McGarty, C. and Mavor, K.I., 2009. Transforming "apathy into movement": The role of prosocial emotions in motivating action for social change. *Personality and Social Psychology Review*, 13, 310-333. DOI: 10.1177/1088868309343290.

Wood, L.J., Boruff, B.J. and Smith, H.M., 2013. When disaster strikes … how communites cope and adapt. In book: Social Capital: Theory, Measurement and Outcomes, Chapter 6, Nova Publishers, pp. 143-168.

Zhao, J., Sun, P., Wang, M. and Zhang, W., 2018. Left-behind adolescents' hopes and fears for the future in rural China. *Journal of Adolescence*, 63, 64-74. DOI: 10.1016/j.adolescence.2017.11.015

[DOR: 20.1001.1.15622916.2020.19.6.36.8]