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**BARRIERS TO FARMERS' PARTICIPATION IN ESTABLISHING
WATER USER ASSOCIATIONS: THE CASE OF IRRIGATION AND
DRAINAGE NETWORK OF NORTHEAST AHWAZ, IRAN**

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ABSTRACT

Concern about water resources in semi-arid areas of the world has led to the introduction of a participatory management system of water, which potentially challenges farmers' willingness to involvement. Establishing water user associations has altered the water management system in irrigation and drainage networks. Undoubtedly, promoting these changes in rural areas, where the new social changes are slowly accepted, is encountered with various obstacles. As such, this study was conducted to recognize the impediments of establishing water user associations through the eyes of those working in an irrigation and drainage network. Data were collected through a questionnaire which consisted of questions regarding social, financial, cultural, organizational, management and attitude barriers. Analysis of data revealed that management barriers were ranked at the first place followed by the cultural, attitude and social ones. However, lack of motives to stimulate users into participatory system of water management, farmers' inabilities to combat with those who illegally extract water, inability to equal and justice-based allocation of water to different users, farmers' preferences to instant individual advantages instead of future common advantages, negative attitude of farmers toward efficacy of local associations, lack of informative opportunities for making farmers aware of the WUAs' benefits were recognized as the strongest barriers, respectively. The results also showed that there was significantly positive correlation among four categories of barriers including social, cultural, management and attitude. This means that they were interrelated and any intervention to change one could affect the others. Hence, to initiate involvement of the local people into decentralized systems of water resources management, salient attempts are needed to empower farmers for removing the barriers, mainly management and social.

Keywords: *Water user association, participation, barriers, Iran.*

INTRODUCTION

Water shortage mainly due to reduced rain, mismanagement or poor management of users has made principal concerns for governments to solve supply problems. Eventually, concern about agricultural water resources, especially in arid and semi-arid areas of the world, has led to the introduction of a participatory management system of water, which potentially challenges farmers' willingness to involvement. Many countries have adopted reform policies such as transferring rights and responsibilities of irrigation systems from government agencies to farmers' associations and other private institutions (Qiao *et al.*, 2009). Irrigation management transfer and the creation of Water User Associations (WUAs) seemed to be a promising solution to reduce conflicts, to make water management more efficient and to keep up the irrigation infrastructure (Wegerich, 2008). Lopez-Gunn (2003), in this respect, pointed out that WUAs can play an important role in facilitating factors that encourage collective action. In addition, they can increase the political capital among small land holders, as well.

Generally, a water user association (WUA) is empowered to maintain and manage the irrigation and drainage system and to collect fees to cover its expenses (Qiao *et al.*, 2009). Mustafa *et al.* (2016) insisted that farmers nevertheless prefer WUAs because they are helpful in gaining access to patronage and water. Establishing such associations has altered the water management system in irrigation and drainage networks. It is widely believed that direct participation in irrigation management by farmers is an effective way of improving farmers' knowledge of irrigation and efficiency of water use (Qiao *et al.*, 2009). Undoubtedly, promoting these changes in rural areas, where the new social changes are slowly accepted, is encountered with various obstacles. Taking this into account, it is questionable what factors would be kept in mind as the inhibitors of establishing WUAs. Gholamrezaei *et al.* (2014) stated that five factors including inattention of government authorities, unsound water allocation mechanism, lack of negotiation with farmers as the users, impartial rules and lack of commitment among authorities are the most important political-administrative impediments of farmers' tendency to establish WUA. Ataei and Izadi (2014) also in their study on comparison of WUAs' adopter and non-adopter farmers recognized that farmers who were agree with involvement in WUAs showed more positive attitude and higher information level about WUAs, more amount of trust, solidarity and social participation, less experiences of conflict over water with peer, and less satisfaction of governmental authorities' function regarding water allocation. Moreover, other studies (Khanal, 2003; Lopez-Gunn, 2003; Omid *et al.*, 2012; Wegerich, 2008) indicated that government central role in water allocation, negative attitude of authorities for transferring the power to local community, infrastructural inefficacy of irrigation and drainage networks, inequality in water distribution, lack of trust to association's management committee, low financial supports either by government or farmers, and top-down hierarchical structures which refer to management instead of governance, hamper the establishing of WUAs. Hence, one strand of the literature suggests that the major of studies done to identify the inhibitors or drivers

of WUAs' creation have been focused on the water users' perspectives, while another strand highlights the contribution of various factors to prevent establishing WUAs. As such this study was conducted to recognize the impediments of establishing WUAs through the eyes of those working in an irrigation and drainage network. To do this, the impediments were classified into six major factors including social, financial, cultural, management, organizational and also attitude, as a separate category.

In Iran WUAs dominantly deal with surface water distribution. Khuzestan province, with an area equal to 64,057 square kilometers in southwest of Iran, has third of total surface water resources of the country. While, five main rivers of Karoon, Dez, Karkheh, Maroon and Zohreh-Jarahi and fertile lands are the most important natural features in this province, high levels of land salinity and water table are the limiting factors for agricultural activities which are privileged in four seasons of the year. Development of agriculture in this region with saline soils, ground water and climatic conditions requires design, implementation, operation and maintenance of the irrigation and drainage networks (Golabi *et al.*, 2017). Irrigation and drainage network of Northeast Ahwaz in Khuzestan provides irrigation water for 19510 ha of farmlands through canals which have been built since 1998. No water user association or at least a local entity has been established up to now, for managing and monitoring the water distribution as well as safekeeping the canals and other infrastructures. All of these tasks routinely are performed by the staff of irrigation and drainage network agency.

MATERIALS AND METHODS

Data was collected in November 2017 using a questionnaire. All the staff working in the irrigation and drainage network of Northeast Ahwaz in Khuzestan Province, Iran, was surveyed leading to a final number of 30 persons. The view of respondents was measured on six factors which may hamper the establishing of WUAs in the region. Our questionnaire was classified into two parts: personal characteristics of respondents and barriers. In total, to measure the barriers which composed of social, financial, cultural, organizational, management and attitude aspects, 29 items were used. A likert scale rating from 1 to 5, reflecting very low to very high respondents' agreement, was applied. A number of socio-demographic questions were asked covering age, education, work experience and residency in rural areas. All of the respondents were male. Data were analyzed using SPSS software.

RESULTS AND DISCUSSION

While 80 % of respondents had academic degree, about 67 % of them was younger than 40. Almost most of them lived in urban areas and only near 17 % were inhabitant of rural. All of the respondents worked in the irrigation and drainage network agency for more than 5 years. About 67 % of our respondents have experienced working in the irrigation and drainage network agency for more than 10 years.

In the following sections, the respondents' view regarding each category of barriers have been analyzed and explained in detail.

Social barriers heavily depend on the context in which farmers live and relate with each other. Our findings showed that the most important barriers to establish a WUA in the study area, respectively, are "lack of motives to stimulate users into participatory system of water management ($\bar{X}= 4.47$)", "farmers' reluctance to financial participation in protecting of canals and infrastructures ($\bar{X}= 3.92$)", and "illegally water extracting from river and canals ($\bar{X}= 3.85$)" (Table 1). In fact, lack of policies that give farmers incentives to involve in participatory water management was highlighted by our respondents. As Wegerich (2008) insisted transferring rights and responsibilities of irrigation systems from government agencies to farmers' associations should not imply rapid and complete withdrawal of the state. In line with this, government bodies must pay more attempts on preparing an enabling environment which contain providing incentive and motives for participation. Unexpectedly, "farmers' non-commitment to pay water charge ($\bar{X}= 2.85$)" ranked at the last place (Table 1), showing that if farmers are supplied with a fair share of the water in a timely manner, they will incline to pay for it. Because they already have to pay for water are supplied for them during the planting season from the irrigation and drainage agency which administered totally by the state.

As demonstrated in Table 1, our respondents highlighted if farmers are motivated to establish a WUA, the most important financial barriers which hamper them are "farmers low income ($\bar{X}= 3.66$)" following by "no need to establish an entity to distribute water due to enough access to available water ($\bar{X}= 3.28$)". As pointed out by Lopez-Gunn (2003), while solutions like subsidies and payments can help mitigate aquifer overuse, these are not a long-term or sustainable option. Therefore, financial support by farmers is crucial. On the other hand, clearly stated by our respondents that as long as water is readily available for farmers and they have to pay just the water charge, they will be reluctant to establish an entity which enforced them into excessive costs. Moreover, water charge, in practice, is estimated rather than calculated by cubic meter. From our respondents' view, in compare to other items, "diversity of current water resources which obviate need to establish a WUA ($\bar{X}= 2.85$)" could not be a substantial obstacle, because there were no diverse water resources in the region.

Table 1 also shows a descriptive statistics of the items used to measure cultural barriers. Findings indicated that although "lack of informative opportunities for making farmers aware of the WUAs' benefits ($\bar{X}= 3.90$)" ranked at the first place, other items also gained a nearly similar mean scores. This reflects that all the items which mainly focused on lack of awareness about benefits, function and task of WUAs due to absence of educational opportunities and information sources are moderately important as the cultural barriers in the study area.

Considering barriers listed in Table 1, "non-autonomy of WUAs in water management due to government interference in affairs ($\bar{X}= 3.04$)" was regarded as the most important factor which hamper establishing a WUA from an

organizational point of view. As noted by Lopez-Gunn (2003), only sound institutional design of WUAs can favor self-governance and management by farmers. When farmers or WUAs are not involved “in decision making on water allocation, hence farmers are supposed to pay for a service which does not seem to give the farmers freedom in terms of quantity and timing of water delivery” (Bucknall *et al.*, 2001; cited in: Wegerich, 2008, p.46). After that, the items “undesirable experiences of previous activities of water organization ($\bar{X}= 2.47$)” and “no need to establish the WUA due to existence of parallel rural production cooperatives ($\bar{X}= 2.24$)” ranked at the second and third places, respectively. However, these items were not considered as the potentially strong barriers, our respondents explained when farmers are not paid compensation instead of losses they experience because of inefficient irrigation services, they will not trust to the water organization or any entities which would be in charge of water distribution. From the attitudinal perspective, “farmers’ preferences to instant individual advantages instead of future common advantages ($\bar{X}= 4. 28$)” following by the “negative attitude of farmers toward efficacy of local associations ($\bar{X}= 3.95$)” were perceived as the most principal barriers (Table 1). However agricultural extension and education programs could make great changes in rural areas of Iran, the current attitude dominated among rural trace the Rogers’ thoughts which marked farmers as those who prefer dependency to governmental authority and instant advantage instead of future advantages.

Lastly, the most significant management barriers which negatively affect farmers’ willingness to participate in a water entity were the “inability of farmers to combat with those who illegally extract water ($\bar{X}= 4. 42$)”, and “inability of farmers to equal and justice-based allocation of water to different users ($\bar{X}= 4.38$)”, respectively (Table 1). These findings are strongly supportive of those stated as the social, attitude and to somewhat cultural barriers.

A precise examination of the findings indicated in Table 1 revealed that management barriers ($\bar{X}= 4. 07$ out of 5) were ranked at the first place, as the most powerful barrier, followed by cultural ($\bar{X}= 3.79$ out of 5), attitude ($\bar{X}= 3.72$ out of 5), social ($\bar{X}= 3.71$ out of 5), financial ($\bar{X}= 3.19$ out of 5) and organizational ($\bar{X}= 2.45$ out of 5) ones, respectively. Although cultural, attitude, and social barriers gained almost a same mean score showing a moderate importance, the financial and organizational barriers revealed a relatively weak mean score in terms of importance.

Table 1. Respondents’ view regarding different categories of barriers

	Item	Mean	SD	Rank
Social barriers	lack of motives to stimulate users into participatory system of water management	4.47	0.60	1
	farmers’ reluctance to financial participation in protecting of canals and infrastructures	3.92	0.92	2
	illegally water extracting from river and canals	3.85	1	3
	inter-personal conflicts between farmers over water	3.71	0.71	4

	weakness of farmers in operating collective actions	3.61	0.74	5
	conflicts among neighbor rural areas	3.57	0.74	6
	farmers' non-commitment to pay water charge	2.85	1	7
	Mean	3.71	-	-
Financial barriers	farmers' low income	3.66	0.65	1
	no need to establish an entity to distribute water due to enough access to available water	3.28	0.84	2
	insufficient land ownership amount	3.14	1.38	3
	lack of credits and financial facilities	3.04	1.02	4
	diversity of current water resources which obviate need to establish a WUA	2.85	0.91	5
	Mean	3.19	-	-
Cultural barriers	lack of informative opportunities for making farmers aware of the WUAs' benefits	3.90	1.04	1
	low educational level of farmers	3.80	1.16	2
	farmers' ignorance about the function and tasks of WUA	3.76	1.26	3
	lack of access to and contact with information sources	3.71	1.10	4
	Mean	3.79	-	-
Organizational barriers	non-autonomy of WUAs in water management due to government interference in affairs	3.04	1.11	1
	undesirable experiences of previous activities of water organization	2.47	1.07	2
	no need to establish the WUA due to existence of parallel rural production cooperatives	2.24	1.23	3
	opposition of water organization authorities for establishing WUA	2.04	1.20	4
	Mean	2.45	-	-
Attitude barriers	farmers' preferences to instant individual advantages instead of future common advantages	4.28	1	1
	negative attitude of farmers toward efficacy of local associations	3.95	0.92	2
	lack of the proper perception of regional water scarcity among farmers	3.80	0.98	3
	elite's misinterpretations about the status of WUAs	3.61	0.92	4
	farmers' negative attitude toward the function of ex-associations in the region	2.95	1.39	5
	Mean	3.72	-	-
Management barriers	inability of farmers to combat with those who illegally extract water	4.42	1.07	1
	inability of farmers to equal and justice-based allocation of water to different users	4.38	1.07	2
	inability of farmers to protect canals and infrastructures from probable damages	3.90	1.17	3
	the management inability of farmers to administer the established entity	3.57	0.97	4
	Mean	4.07	-	-

To find which categories of barriers interrelated with others, a Pearson Correlation test was run. As Table 2 demonstrated, there were strong positive relationships between management barriers with cultural ($r = 0.654$), attitude ($r = 0.626$) and social barriers ($r = 0.903$). Expectedly, there were also strong positive correlations between cultural with attitude ($r = 0.665$) and social barriers ($r = 0.787$). As descriptive analysis of barriers revealed, there were some interrelationships between these variables; which means that they can affect each other positively.

Table 2. The relationship between different categories of barriers

Variable	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
Management (X ₁)	1					
Cultural (X ₂)	0.654**	1				
Attitude (X ₃)	0.626**	0.665**	1			
Social (X ₄)	0.903**	0.787**	0.625**	1		
Financial (X ₅)	0.112	0.038	0.378**	0.063	1	
Organizational (X ₆)	-0.169	-0.277	-0.144	-0.117	0.071	1

** significant at 0.01 level

CONCLUSIONS

This study revealed that management barriers were perceived as the most significant factors which potentially hamper the establishing of WUAs among farmers. After that, cultural, attitude and social barriers were recognized as the moderate important barriers in compare to financial and organizational barriers which ranked as the relatively weak factors. In detail, lack of motives to stimulate farmers into participatory interventions regarding water management, some inabilities of farmers, for example to combat with those who illegally extract water or to equally water allocation, farmers' willingness toward instant individual advantages, negative farmers' attitude efficacy of local entities, and finally, lack of informative opportunities to aware farmers regarding the WUAs' benefits were recognized as the strongest barriers, respectively. The results also showed that four categories of barriers including management cultural, attitude and social were interrelated and any intervention to change one could affect the others. Hence, the evidence seems to suggest that to initiate involvement of the local people into decentralized systems of water resources management, salient attempts are needed to empower farmers for removing the barriers, mainly management and social.

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