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Farmers' Perceptions toward Agricultural Water Conflict: The Case of Doroodzan Dam Irrigation Network, Iran

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ABSTRACT

Water conflict is considered as one of the major challenges in agricultural water management. "Agricultural water conflict" is a term describing disputes and differences among water stakeholders over an access to water resources in the agricultural sector. The purpose of this paper was to investigate farmers' viewpoints toward agricultural water conflicts. A descriptive correlation method was adopted and the study was conducted in Doroodzan dam irrigation network in Fars province, Iran. Multistage stratified random sampling was used to collect data from 294 farmers. The research tool included a questionnaire whose validity was confirmed by a group of professionals. A pilot study was conducted during which the Cronbach's alpha test was calculated to determinate the reliability of data collection instrument. Findings revealed that, among the groups involved in water conflicts, the main conflict was between farmers and the government. Farmers in downstream were the main losers in water distribution. The dominant water conflict was "latent" as well. The main reasons for agricultural water conflict were "water scarcity", "drought", and "the kind of water management". Farmers' satisfaction toward water management was "low". Farmers' age, education levels, satisfaction toward water management, and attitude toward geographical and climatic conditions had a significant relationship with agricultural water conflict.

Keywords: Agriculture, Doroodzan, Farmers, Water conflict.

INTRODUCTION

Water is a natural resource like wood, coal, oil, or gold. However, water is different from other natural resources in that it is not only used for numerous economic and technical purposes, but also has cultural, social and symbolic dimensions. We could survive without coal or wood or oil, but water is a basis for life. This is why in many religions, water has a special status and is often at the beginning of creation accounts (Sehring and Diebold, 2012). Therefore, water resources development and management is imperative for sustainable agriculture in water scarce areas (Ashraf *et al*., 2007; Azizi Khalkheili and Zamani, 2009). One of the major challenges in water management is water conflict.

Water conflict is a term describing a conflict between countries, states, or groups over access to water resources (Tulloch, 2009; Kameri-Mbote, 2007; Wolf *et al*., 1999). Water related conflicts are those arising between two or more parties holding competing claims over a water resource, its allocation, or its use (OECD, 2005). "Water conflict in this study is limited to local conflict in agricultural sector related to the use of fresh surface water" and the intention of water conflict in this article is a term describing struggles among water stakeholders in agricultural sector.

More than 82 percent of Iran's territory is located in arid and semi-arid zones and over

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90 percent of available water is used for agricultural purposes which faces shortages of water (Ardekanian, 2003; Khoshbakht, 2011). Also, over 80 percent of water is wasted, the main reason being lack of advanced irrigation technologies (Beheshtinejad, 2009). One of the aspects of this mismanagement is about conflict management among water stakeholders.

Agricultural water conflict in Iran occurs mostly between the government (as owner and manager of water) and farmers (as users). On the other hand, the environment has been damaged by these conflicts. According to Table 1, one can observe three kinds of conflicts in agricultural sector of Iran, while the dominant conflict is related to water management (third row in Table 1). Generally in Iran, there are three turning points in trend of agricultural water conflict (Table 1).

Conflict theories seek to scientifically explain the general contours of conflict in a society: how conflict starts and varies, and the effects it brings. The central concerns of conflict theories are the unequal distribution of scarce resources and power. These resources might be different for each theorist, but conflict theorists usually work with Weber's three systems of stratification: class, status, and power. Conflict theorists generally see power as the central feature of society, rather than thinking of society as being held together by collective agreement concerning a cohesive set of cultural standards, as functionalists do. Where power is located and who uses it (and who doesn't) are thus fundamental to conflict theory. In this way of thinking about things, power isn't necessarily bad: it is a primary factor that guides society and social relations (Coser *et al*., 2006). Conflict theories can be used to explain the interactions between societies during times of turmoil and change.

Table 1. Turning points in trend of agricultural water conflict in Iran.

Stages	Characteristics of each stage
Before land reform (Latent water conflict: Before 1963)	Before land reform in Iran, landlords were known as owners of agricultural water resources. They were manager of water and controlled consumption and distribution of water. Consumption and distribution of water was controlled by them under a specific discipline. Therefore, there was no particular water conflict in that period.
After land reform up to political revolution of Iran (The start of water conflict:1963-1979)	After land reform, landlords became weak and the system of master and peasant was overthrown. In the continuation of land reform, water was declared as national resource. The government was recognized as responsible for control and managing of water in agricultural sector. The government was assigned to administrate distribution of water among stakeholders. In that way, some rules were registered for better control of water distribution. Forcefully, agricultural water conflicts started from this point, because the government had not needed control on water resources and water beneficiaries especially in regard to landlords. For example, unauthorized revenue from water resources increased after land reform. Also, digging deep wells developed. We can say in this period not only the government had insufficient power to control water conflict, but that was a factor causing conflict between itself and stakeholders.
After political revolution up to now (Culmination of water conflict: After 1979)	After political revolution in 1979, the government decreased its control over water resources. In that condition, there was no anticipation and legal mechanism for controlling water conflicts. Furthermore, in the last decade, climate change, especially drought added to this trend and increased water conflicts in agricultural sector. With the condition of drought and water scarcity, managing water conflict is more complex. The main part of conflict is between the government and stakeholders especially in districts that are confronting with drought. In the meantime, urban and industrial water consumption has increased in recent years and government has allocated most of the water savings to these sectors. It is one of reason of conflict between the government and stakeholders.

Source: (Bijani and Hayati, 2011)

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There are three models of conflict theory (Tahir, 2009):

Marxism

For Marxist theory, power is the capacity to affect the life situations of people. Power is a key feature of the structuring relations of society. Accordingly, dominant power is largely in the hands of those who own and control the means of life (Ibid).

Conflicts about water in agricultural sector of Iran can be explained based on Marxism theory. According to Table 1, in Iran, the government manages and distributes water recourses among stakeholders. The government is owner and controller of water in all dimensions and water stakeholders have no responsibility in this management system and they are only water customers.

Parsonian Conflict Theory (Dahrendorf)

This theory is concerned exclusively with relations of authority. For these alone (sic) are parts of social structure and, therefore, permit the systematic derivation of group conflicts. Moreover, where there are authority relations, the super ordinate element is socially expected to control by orders, commands, warning, and prohibitions, the behavior of the subordinate element. It is not denied that persons or groups have power, but group conflicts are not the product of structurally fortuitous relations of power but come forth wherever authority is exercised. Finally, since authority relations are necessarily present in all societies, conflict is inevitable (Ibid).

As mentioned before, presently, the government controls water resources in Iran. In addition, in the local agricultural structures, power distribution is different. The local powers, in a view, are defined as a more accessible and easier approach to access water resources. For example, in many irrigation networks, farmers who live in upstream receive a greater share of water and farmers with influence in the governmental water distribution system acquire more share of water than others.

Elite Conflict Theory (C. Wright Mills)

In Mills' view, social structures are created through conflict between people with differing interests and resources. Individuals and resources, in turn, are influenced by these structures and by the "unequal distribution of power and resources in the society" (Knapp, 1994). Elites have power by virtue of their location in three linked key institutions (structures) in society: political, dominated by the executive power of the Federal Government, the economic, dominated by a few hundred corporations, and military (Tahir, 2009).

Differences between Farmers Include a Wide Range

Area of land, type of land ownership, level of education, work experience, having a second job and source of income other than agriculture, social status and influence in the government, etc can distinguish farmers from their peers and facilitate access to water source. This trend can cause water conflicts in agricultural sector, which are real conflicts when one stakeholder begins to act in favor of his interests and this is seen as a threatening or aggressive act by the other actor(s) (Knierim and Nagel, 2000).

According to Carius *et al.* (2004), there are three major linkages between conflict and water**:** (1) Access to adequate water supplies: Conflict is most likely to occur over water when disputes involve access to water of adequate quantity and quality. Even when water supplies are not severely limited, allocation of water among different users and uses (urban residents and agriculture, for example) can be highly contested; (2) Water, livelihood loss, and conflict: Water's importance in sustaining

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human livelihoods can indirectly link it to conflict. Water is a basic resource for agriculture, which is traditionally the largest source of livelihoods. If this livelihood is no longer available, people are often forced to search for job opportunities in the cities or turn to other, sometimes illicit, ways to make a living, and (3) Water management and conflict: In most cases, it is not the lack of water that leads to conflict, but the inadequate way the resource is governed and managed. There are many reasons why water management fails, including lack of adequate water institutions, inadequate administrative capacity, lack of transparency, ambiguous jurisdictions, overlapping functions, fragmented institutional structures, and lack of necessary infrastructure.

Conflicts over irrigation water are one of the most common types of water conflicts. Rivalries between upstream and downstream riparian or between users of a common irrigation system can lead to the destruction of infrastructure or violence against people. In this regard, key issues which can create water conflict especially between farmer to farmer are as follows (Houdret *et al*., 2006):

1. Increasing water demand and scarcity, often coupled with weak water institutions;
2. Overexploitation of groundwater resources and subsequent falling water tables, rendering access difficult for some or all farmers;
3. Lacking or damaged water infrastructure entailing unequal access to and use of the resource; and
4. Existing rivalries and socio-economic inequalities between farmers.

In another view, agricultural water conflicts have some effects on the environment. Indeed, water scarcity, inequality to access, use, and decision about water, can be a threat in the stakeholders' life quality and an obstacle in the road of human and environmental development. It is clear that environment can be affected by these conflicts. According to Green (2002), four factors can affect water conflict: Dynamic of population, the kind of organization, environment, and the kind of technology.

Some factors that can impact how we respond to water conflict are gender, self-concept, expectations, situation, position (power), communication skills, life experiences, and the kind and practice of conflict management (Anonymous, 2003).

Based on what has been stated, to investigate the agricultural water conflict, the groups involved in this conflict and the factors influencing conflict and cooperation among groups should be identified. Accordingly, there is a strong need for an extensive research. Therefore, the purpose of this study was to investigate agricultural water conflicts from the perspective of farmers (as the most important water stakeholders in the agricultural sector) in Doroodzan dam irrigation network zone in Fars province, Iran, using survey research.

MATERIALS AND METHODS

Study Area

The study was conducted in downstream of Doroodzan dam, Fars Province, in south-western Iran (Figure 1). Fars Province is one of the leading Iranian regions in agricultural production (the leading province in wheat production), although it has recently confronted water scarcity (Hayati and Karami, 2005). Doroodzan dam has one of the largest reservoirs in Fars Province, providing water for 4,200 km^2 of farmland. It is also a major drinking water supplier for Marvdasht and Shiraz cities (Azizi Khalkheili and Zamani, 2009). Doroodzan Dam irrigation network consists of eight segments: Main canal, Ordibehsht canal, Hamoon canal, Left canal (in upstream), Amir, Fayzabad, Tilakan, and Mavan segments (in downstream). These eight segments are divided in two main parts: upstream and downstream.

(Figure 1. A general map of Iran illustrating the location of the study area)

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Figure 1. A general map of Iran illustrating the location of the study area.

Research Method

This research was conducted based on the framework of the applied approach using a correlative-descriptive research method.

Participants

A multistage stratified random sampling was used to select a sample of farmers from the area under investigation. From each of the network's segment, five villages were randomly selected, which summed to a total of 40 villages. Then, from each village, proportionate to its population, 7 to 8 farmers were selected randomly. The final sample consisted of 294 farmers who used water from the irrigation network of Doroodzan dam.

Instrument

Data were collected during October 2011 up to February 2012 using a structured questionnaire. Its "face validity" was confirmed by experts in Agricultural Extension and Education Department, Shiraz University. A pilot study was conducted and Cronbach's alpha test was calculated to determinate the data collection instrument reliability. The data obtained through the questionnaire were analyzed using $SPSS_{19}$.

RESULTS AND DISCUSSION

Descriptive Statistics

Over 94 percent of farmers were men (277 people). The age of the respondents in this study ranged from 18 to 90 years old with a mean of 50 years. The range of educational backgrounds was from 0 to 18 years of schooling with an average of 5.7 years. Indeed, 29.6 percent of respondents were illiterate and 28.2 percent had 1-5 years of education (basic literacy). The range of family size was from 1 to 14 people with a median of 4 people. The agricultural work experience of farmers ranged from 1 to 75 years with a mean of 32.4 years. About 60 percent of farmers engaged in agriculture and did not have a second job. Farmers had a range of land size from 1 to 60 hectares, with a mean of 9.6 hectares. However, more than one-third of farmers (34.4 percent) had less than 5 hectares agricultural land. 84.4 percent of farmers were owner of lands that

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they work on them. Over 95 percent of farmers used water from Doroodzan dam irrigation network. In this regard, most of them (98 percent) used traditional methods for irrigation of their lands. About 76 percent of the farms were cultivated just one time per year and 23.8 percent could be cultivated two times each year. The average of annual water supply costs that farmers had to pay to the government was 474,700 Iranian Rials (38.72 U.S. Dollars) per hectare.

Agricultural Water Conflict and Its Types

Descriptive statistics pertaining to each item regarding agricultural water conflict are presented in Table 2. In this study, agricultural water conflict was measured by 14 items by Likert scale. Items extracted from the literature review and through interviews with farmers and water experts were selected as the factors that may influence water conflict. Most item means are in the range of 3 to 4 (on a scale of 0-5).

The range of agricultural water conflict was from 0 to 70. Figure 2 shows 86.8 (42.9+43.9) percent of farmers ranked agricultural water conflicts between moderate to high range.

In general, four types of water conflicts can be outlined as follows.

1. **No conflict**: Any peaceful community is likely to face conflict sometimes, although communities in this category are good at resolving conflict before it develops.

2. **Surface conflict**: This has shallow or no roots. It may be due to misunderstanding of goals, which can be addressed by improved communication and the conscious effort of opposing groups to understand each

Table 2. The amount of agricultural water conflict: Farmers' viewpoint.

Agricultural water conflict: Statements [a]	Mean	Standard deviation	Priority
Doroodzan dam is near Shiraz and Marvdasht cities and, therefore, the bulk of the dam's stored water is allocated to urban consumers.	4.19	0.90	1
Drought in recent years is the main factor aggravating the conflict among water stakeholders.	4.18	1.06	2
Water conflicts in downstream of Doroodzan dam is more than in upstream.	4.10	1.26	3
Injustice in the distribution of water is usual in the management of water distribution in Doroodzan dam downstream.	3.88	1.27	4
Water conflict between farmers and the government is a usual phenomenon for many years and this conflict is going more gradually.	3.48	1.21	5
Bribing governmental agents to have access to more water is a usual manner in various forms.	3.35	1.49	6
I'm sure that a fraud happens in lottery time of water distribution.	3.14	1.77	7
Always, there is conflict over the use of water in Doroodzan dam irrigation network and it is an undesirable norm.	3.11	1.37	8
Design and construction of irrigation canals is not suitable, so my farm has not received the needed water.	2.96	1.64	9
Several times I have had quarrel with other farmers over use of water	2.28	1.64	10
If more water is required, we manipulate the water canals or water supply valves with other farmers' collaboration.	2.18	1.72	11
Fulmination of other farmers and governmental regional experts is usual on the use of water.	2.14	1.35	12
Sometimes, I have to withdraw my needed water by pumping from main canals.	1.78	1.74	13
I have been reprimanded several times, because I have had some conflicts with water distribution agents.	1.33	1.55	14
Total score of water conflict N: 294 Minimum: 12 Maximum: 63 Mean: 42.07 Std. deviation: 9.38			
Range from 0 to 70, Mean: 42.07 $\Rightarrow$ (Moderate to high)			

[a] Responses weighted 0 to 5: From none (0; very low (1); low (2); moderate (3); high (4), and very high (5).

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Agricultural water conflict levels			
	Frequency	Percent	Cumulative Percent
No conflict	0	0	0
Very low	3	1	1
Low	23	7.8	8.8
Moderate	126	42.9	51.7
High	129	43.9	95.6
Very high	13	4.4	100
Total	294	100	

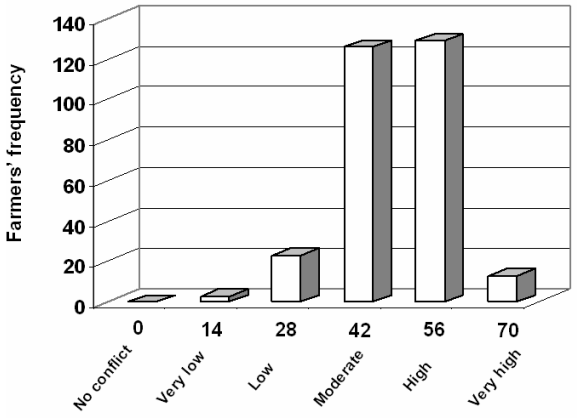

Figure 2. Agricultural water conflict levels: Farmers' opinion.

other's needs and opinions.

3. **Latent conflict**: This is the conflict below the surface. It might need to be brought out into the open before it can be effectively addressed.

4. **Open conflict**: This conflict is very visible and has deep roots, sometimes over several generations. Both the causes and the effects need to be addressed (Tearfund, 2003; Bijani and Hayati, 2011). To determine the dominant contrast, for each of the types of conflicts described above, 5 to 6 items were provided in the questionnaire. According to Table 3, from farmers' viewpoints, the dominant water conflict in Doroodzan dam irrigation network was "latent conflict".

Causes of Agricultural Water Conflict

Table 4 shows prioritizing of elements can cause water conflict among farmers and other water users. Based on the information of Table 5, ranks were allocated to variables in respect of the most important causes of water conflict in agricultural sector. "Water scarcity" was in the first rank. Actually, in recent years, conflict among stakeholders has increased with regard to unauthorized uses of surface flow and underground waters in agricultural sector. "Drought" held the second rank. This finding that revealed water scarcity and droughts were the first and second factors which cause water conflicts shows another finding that is the close relationship of these factors together. The third and fourth priorities are associated with water management.

After the revolution in 1979, the government decreased its control over water resources. In that condition, there was not any anticipation and a legal mechanism for controlling water conflicts. Furthermore, in

Table 3. Types of agricultural water conflict.

Types of conflict	Items[a]	Range	Total scores (Sum)	Minimum	Maximum	Mode	Median	Mean	Standard deviation	Priority
No conflict	5	0 to 25	4166	5	25	17	14	14.17	3.85	2
Surface conflict	5	0 to 25	4098	3	22	14	14	13.94	3.37	3
Latent conflict	6	0 to 30	5438	4	29	21	19	18.50	4.84	1
Open conflict	6	0 to 30	3871	0	38	11	13	13.17	5.37	4

The dominant conflict: Latent conflict

[a] Measuring is done based on the spectrum from never (0), very low (1) to very high (5).

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Table 4. The most important causes of water conflict in agricultural sector.

Causes of water conflict in agricultural sector	Mode	Median	Mean	Standard deviation	Priority [b]
Water scarcity	1	2	1.99	1.94	1
Drought	1	1	2.05	2.64	2
Type of water management quality by Governmental Water Organization	1	3	3.46	3.13	3
Lack of local management of water resources by farmers	2	3	4.17	3.20	4
Weakness or absence of "water user associations"	2	4	5.14	3.02	5
Impossibility for drilling wells	11	4	5.14	3.64	6
Type of climate	1	5	5.19	3.41	7
Lack of cooperation and interaction among farmers	4	5	5.31	3.15	8
Lack of unity among farmers	11	5	5.79	3.18	9
Farmers' selfishness	2 [a]	5	5.80	3.34	10
Increased number of water users, especially those who were not water propertied in the past	11	5	5.84	3.37	11

[a] Multiple modes exist. The smallest value is shown. [b] Prioritization is done based on the average (mean) score from 1 to 11 (1 is the first rank and 11 is the last).

the last decade, another important factor added to this trend and increased water conflicts in agricultural sector. In fact, this factor was weather changes, especially drought. With the condition of drought and water scarcity, managing water conflict is more complex. The main part of the conflict is between the government and stakeholders especially in districts which are confronting drought. In the meantime, urban and industrial water consumption has increased in recent years and the government has allocated most of the water savings to these sectors. It is one of the reasons of the conflict between the government and stakeholders (Bijani and Hayati, 2011). Other priorities can be seen in Table 4.

The Main Parties Involved in Water Conflict

Table 5 shows the groups involved in water conflicts. The conflict between farmers and the government ranks the first. In fact, farmers are convinced that the government has failed to provide and deliver the needed water to farmers from Doroodzan

Table 5. The main parties involved in conflicts over the use of water in agricultural sector.

The main parties involved in water conflict	Mode	Median	Mean	Standard deviation	Priority [a]
Farmers with government	1	1	2.73	2.45	1
Farmers in downstream and upstream	1	2	3.08	2.36	2
Farmers with urban consumers	1	3	3.87	2.60	3
Farmers with each other	8	4	4.27	2.76	4
Farmers with industrial consumers	8	4	4.70	2.46	5
Large farmers (land lords) with small farmers	8	5	4.92	2.41	6
Modern farmers with traditional farmers	8	5	4.93	2.40	7
Land owners (farmers) with farmers without land	8	5	5.04	2.41	8

[a] Prioritization is done based on the average (mean) score from 1 to 8 (1 is the first rank and 8 is the last).

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dam. In this regard, farmers believed that the water was not provided on a suitable time span i.e. it was not delivered at the time of crop water stress, inflicting great damage to farmers. The second priority is related to the conflicts of the farmers in downstream and upstream. In fact, most farmers believe available water is consumed in the upstream and little water remains for farmers in downstream. Based on interviews conducted, it is revealed that the farmers in upstream have more influence in the government policies and decisions toward their benefit. The third conflict is between agriculture and urban consumers. Doroodzan dam is a major drinking water supplier for Marvdasht and Shiraz cities (two big cities near Doroodzan dam). Other priorities are outlined in Table 5.

Table 6 shows water stakeholders who are engaged in conflict over using water with application of Game theory. Viewing all options show farmers in upstream are the "winners" and those in downstream are the "losers". Urban consumers are in the second rank of winners. The government is located in the middle of this ranking. The bulk of the water is used by farmers in upstream and farmers in downstream regions have little access to the needed water. In fact, moving to farthest points in downstream, access to water becomes less and less. They believed that one of the main reasons for this trend was related to poor water management by the government.

The Style of Conflict and Water Management

When we talk about conflict management, a question should be responded. What modes do people use to address conflict? All people can benefit, both personally and professionally, from learning conflict management skills. In this study, three of conflict strategies were studied. They were "avoidance strategy", "oriented solution strategy", and "control strategy". Each of these variables was measured by 4 items. Table 8 shows description of respondents' viewpoints in the study zone. It is noted that "avoidance strategy" was the dominant strategy.

The findings of Tables 7 indicate that farmers avoided from managing water

Table 6. The main water stakeholders who engage conflict toward using water.

Groups	Mode	Median	Mean	Standard deviation	Priority [a]	Status
Upstream farmers	1	1	2.05	1.65	1	Winner
Urban consumers	1	2	2.52	1.57	2	
The government	1	2	2.60	1.64	3	
Industrial consumers	2	3	3.36	1.68	4	
Downstream farmers	5	5	4.76	1.70	5	Loser

[a] Prioritization is done based on the average (mean) score from 1 to 5 (1 is the maximum level of winner and 5 is the maximum level of loser).

Table 7. Farmers' response to water conflict (the style of farmers' conflict management).

Conflict management styles (Strategies)	Items [a]	Range	Total scores (Sum)	Minimum	Maximum	Mode	Median	Mean	Standard deviation	Priority
Avoidance strategy	4	4 to 28	4781	4	28	20	17	16.26	6.00	1
Oriented solution strategy	4	4 to 28	3643	4	28	10	12	12.39	5.58	3
Control strategy	4	4 to 28	4208	4	28	16	14	14.31	6.60	2
The dominant conflict management: Avoidance strategy										

[a] Measuring is done based on the spectrum from always (1) to never (7).

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Table 8. Pearson correlations between agricultural water conflict and some independent variables.

Variables	r	P (Sig)
Age	- 0.296	0.000
Formal educational background	0.274	0.000
Family size	- 0.016	0.786
Annual water supply costs	- 0.018	0.791
Satisfaction toward water management	- 0.256	0.000
Farmers' attitude toward the relation between their farm geographical location and water conflict	0.336	0.000
Extension education services	0.105	0.072

resources by themselves. In fact, they preferred that management be executed by the government.

In regard to the question of "which group has more competencies for managing of agricultural water resources?", about half of the respondents (48.3 percent) believed that the government had priority for this administration. About 26.2 percent believed that the farmers themselves should manage water affaires themselves and 25.5 percent expressed a combination of the government and farmers could do better in this regard. Also, most of them were not members of any formal or non-formal water users' association.

Another parameter in the water resource management is stakeholders' satisfaction. In this research, this variable was measured by 7 items. Findings revealed that satisfaction toward water management was "low", which was consistent with the results of previous findings. Farmers considered the governmental water management as one of the main reasons for the increase in water conflicts in the agricultural sector. Therefore, there was not much satisfaction toward governmental water management style.

Relationship between Agricultural Water Conflict and Selected Variables

Table 8 illustrates the correlation of agricultural water conflict with some of the independent variables. A Pearson correlation test was used to investigate the relationship between agricultural water conflict and selected variables. The findings revealed a significant relationship between the level of water conflict with farmers' age, formal educational background, satisfaction toward water management and farmers' attitude toward the relation between their farm geographical location and water conflict. The Pearson correlation test did not show any significant relationship between agricultural water conflict and farmers' family size, annual water supply costs, and the influences of extension educations.

Farmers' satisfaction toward water management showed an inverse correlation with agricultural water conflict. These findings indicate that farmers who were less satisfied with the management of water resources by the government acknowledged higher levels of water conflicts in their area. In fact, satisfaction increases participation and cooperation, and reduces conflict. Satisfaction toward water management has a direct relation with farmers' participation and interaction in agricultural water use and irrigation problems. Therefore, it can influence water conflict in agricultural sector.

Also, farmers' age had the next highest inverse correlation with agricultural water conflict. In other words, younger farmers acknowledged higher levels of water conflicts. In fact, elder people, due to their greater experience and cognition of the situation and the parties involved in the water conflict, had less conflict with the other stakeholders.

There was a significant correlation between formal educational background and water conflict. Farmers who were more educated felt water conflict deeper than others. In this study, the results indicated

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that people with more education were younger. As stated before, the younger farmers had more water conflicts.

It is believed that appropriate education can reduce water conflict and change it to suitable cooperation between stakeholders (this variable was measured by 7 items). But, there was no significant relationship between extension education services and water conflict. In fact, effective practical educations were not provided for farmers toward water management.

Farmers' attitude toward geographical and climatic conditions was measured by 12 items. This variable had a positive significant relationship with water conflict. In fact, many farmers stated that one of the main causes of water conflicts was the current condition of weather such as drought and water scarcity, especially in recent years (Tables 4 and 8). Shortages of resources increase conflict. In this way, climate changes in recent years have caused water scarcity and increase in agricultural water conflict in Doroodzan dam irrigation network.

Agricultural Water Conflict: Comparing Different Farmers' Groups

As Table 9 shows, there was no significant difference between male and female groups regarding agricultural water conflict (it should be noted that the majority of farmers in this study were male). The result of ***T***-tests further revealed that farmers who lived in upstream (including the main, Ordibehsht, Hamoon, and Left canals) significantly differed from those who were in

Table 9. *T*-tests findings (comparison of the means between farmers' groups according to their perspective toward water conflict).

Variables			N [a]	Mean [b]	Std. deviation	t [c]	Sig. (2-tailed)
Gender	Female		17	40.35	7.98	-0.779	0.436
	Male		277	42.18	9.46		
Farmer's land position	Upstream	Main canal Ordibehsht canal Hamoon canal Left canal	150	40.57	10.49	-0.948	0.034
	Downstream	Amir segment Fayzabad segment Tilakan segment Mavan segment	144	43.63	8.05		
Second job	Yes		114	42.26	10.49	0.261	0.794
	No		176	41.97	8.72		
Type of land ownership	Owner		248	42.01	9.625	-0.067	0.947
	Non-owner		43	42.12	9.625		
Type of irrigation: Use of dam water	Yes		281	42.00	9.46	-0.721	0.471
	No		13	44.09	8.08		
Type of irrigation: Rainfed cultivation	Yes		12	45.00	10.00	1.097	0.273
	No		282	41.96	9.38		
Type of irrigation: Well water	Yes		86	41.94	10.74	-0.164	0.870
	No		208	42.14	8.82		
The number of cultivation	One time per year		224	41.57	9.63	-1.704	0.089
	Two time per year		68	43.78	8.48		
Type of residence in rural areas	Permanent		284	42.08	9.34	0.094	0.925
	Seasonal		10	41.80	9.34		

[a] Number of People who were in subgroup. [b] Scores range is calculated from 0 to 110. [c] The estimated value of Independent Sample t-test.

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downstream (including Amir, Fayzabad, Tilakan, and Mavan segments). In other words, water conflict in downstream zone was more than upstream. In regarding other variables (have a second job, type of land ownership, types of irrigation, number of cultivation and type of residence); no significant differences were observed between groups of farmers.

The analysis of variance (ANOVA) was used to compare the farmers' water conflict means with their land proximity to the network canals (near, far, intermediate distance). There was no significant difference between these three groups. Also, ANOVA showed that there was a significant difference between farmers with different agricultural work experience and area of agricultural land (Table 10).

Concerning farmers' work experience it was observed that the group with more than 30 years of experience had a significant difference with other groups. The group of farmers with less than 15 years and 16-30 years of experience had no significant difference with each other. The least water conflict was among the farmers with the highest work experience (more than 30 years). This finding is consistent with the findings on farmers' age (Table 9). In other words, farmers with more experience involved older people who preferred not to create conflict in the use of water.

Also, there was a significant difference between framers with different area of agricultural land. In this regard, the highest conflict was observed in the group having 6 to 10 hectares. This group consisted of middle-class farmers. Most of them were dependent on agricultural income. Therefore, water was more important for them. Farmers who had lands with less than 5 hectares had a significant difference with the other farmers in regard to agricultural water conflict. This group consisted of small farmers. In other words, farmers who had more lands needed more water. Therefore, they felt more water conflicts.

CONCLUSIONS

Conflict is pervasive in nature and organizations are not untouched with it (Shariq Abbas and Singh, 2012). What is important is to manage conflicts, and to change them from threats to opportunities. Most research deal with a general concept of "resource scarcity" and do not focus on the specific question of water scarcity in relation to conflict. This mirrors the discussion on the specificities of water as a societal factor; in many instances it may be difficult to compare water with other resources (Swedish Water House, 2004). There is a widespread belief that the number and intensity of local water-related conflicts is increasing. Utilizable fresh water for use in agricultural sector is very limited, especially in Iran. This shortage is the cause of

Table 10. ANOVA findings (comparison of the means between farmers' groups from the water conflict perspective).[a]

Variables		N	Mean	Std. deviation	F	Sig. (2-tailed)
Agricultural work experience (Years)	Less than 15	78	45.29 [a]	7.63	11.08	0.000
	16-30	58	43.93 [a]	9.56		
	More than 30	158	39.80 [b]	9.52		
Area of agricultural land (Hectare)	Less than 5	101	39.65 [b]	9.409	5.76	0.003
	6-10	93	44.01 [a]	9.545		
	More than 10	100	42.72 [a]	8.732		
Farmer's land position toward derivative canals	Near	68	41.15	8.229	0.66	0.515
	Far	105	41.85	8.229		
	Intermediate	115	42.77	10.018		

[a] Means as the same letters had no significant difference according to LSD test (scores range is calculated from 0 to 110).

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conflicts among stakeholders. What can be seen in the agricultural water management in Iran is a complex mode which is difficult to be described with conflict theories. Presently, the government is manager of water recourses in Iran and it controls and distributes water between stakeholders. Therefore, we can say this trend is according to Marxism and Parsonian conflict theories. In this way, the government is the owner and the controller of water in all dimensions and water stakeholders have no important role in this management. Therefore, they make no efforts to solve conflicts among themselves and conflicts with the government. The government holds all the responsibilities and farmers are just users. In conformity with the Elite conflict theory, differences between farmers' characteristics include a wide range and due to these differences, they can have a better position for acquiring resources. But, according to findings of this research, at the present time, the main challenges of water conflict in the agricultural sector of Iran are climate changes ("drought" and "water scarcity") and "the kind of water management". Agricultural water conflicts in Doroodzan dam irrigation network shows that there are different goals among stakeholders, especially between farmers and the government. Also, findings revealed that satisfaction toward water management was "low". The findings of this study also confirmed that there was a “latent water conflict” in Doroodzan dam irrigation network. With regard to the options of Game theory, it was evident that farmers in upstream were "winners" and farmers in downstream were "losers". The government was in the middle of this ranking. From the farmers’ viewpoints, water conflict between farmers and the government was the most widespread conflict. Also, the second priority conflict was between farmers in downstream and upstream. Moreover, farmers believed that the most important reference for water resource management is government and they can't do that by themselves.

Appropriate strategies to cope with drought and water scarcity include provision of applied training for optimal use of water, drought-resistant crops, and adoption of proper technologies for water management. With respect to water management, the system should move from governmentality to governance and the government should make efforts to attract farmers' participation.

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تضاد آب کشاورزی: مورد مطالعه، شبکه آبیاری سد درودزن، ایران

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چکیده

تضاد آب به عنوان یکی از مهمترین چالش‌ها در مدیریت آب کشاورزی تلقی می‌گردد. "تضاد آب کشاورزی" اصطلاحی برای توصیف درگیری‌ها و اختلاف‌ها بر سر دسترسی به منابع آب در بخش کشاورزی است. هدف این مقاله، بررسی دیدگاه کشاورزان پیرامون تضاد آب کشاورزی بود که با استفاده از روش توصیفی، همبستگی به عنوان روش تحقیق، انجام شد. این مطالعه، در شبکه آبیاری سد درودزن در استان فارس، انجام گردید. نمونه‌گیری تصادفی چند مرحله‌ای طبقه‌بندی‌شده برای جمع‌آوری داده‌ها از ۲۹۴ کشاورز مورد استفاده قرار گرفت. ابزار پژوهش شامل پرسشنامه‌ای بود که روایی آن توسط گروهی از متخصصان تأیید و پایایی آن با استفاده از یک مطالعه راهنما و آزمون آلفای کرونباخ، محاسبه شد. یافته‌ها نشان داد در میان گروه‌هایی که در بهره‌برداری از آب با یکدیگر تضاد دارند، مناقشه اصلی میان کشاورزان و دولت است. کشاورزان پایین‌دست، بازنده اصلی در توزیع آب بودند. ،"تضاد پنهان"، منازعه غالب آب بود. دلایل اصلی برای افزایش تضاد در بهره‌برداری از منابع آب، "کم‌آبی"، "خشکسالی" و "نوع مدیریت آب" بودند. رضایت کشاورزان از به مدیریت آب "کم" بود. سن، میزان تحصیلات، رضایت از مدیریت آب و نگرش کشاورزان نسبت به شرایط جغرافیایی و اقلیمی، رابطه معنی‌داری با تضاد آب کشاورزی داشت.

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