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The causes and effects of water conflict: evidence from Damavand

Bahareh Gholizadeh and Mehrdad Niknami*

Garmsar Branch, Islamic Azad University, Department of Agricultural Extension and Education, College of Agriculture, 3581631167 Garmsar, Iran
**Corresponding author:* M.niknami@iau-garmsar.ac.ir

Abstract

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In spite of the scarcity of water resources, the farmers' competitions to use water resources and their insistence on it have resulted in the occurrence of conflict and the tragedy of the common resources. Conflict may have both positive and negative aspects. If the conflict resolutions are correctly understood, its causes and effects can be managed. The objective of this study was to investigate the causes and effects of water conflict in Damavand, Iran using structural modeling method. The research method was a relational causal study. Results revealed that water conflict can be attributed to different causes categorized into interdependent climatic, managerial, social, agronomical, and educational factors, among which the climatic factor was found to include the most important causes. These causes have had positive or negative impacts.

Keywords: water conflict; water resource; management; participatory irrigation; climate-smart agriculture; Iran

Introduction

While per capita renewable water is declining throughout the world, it has been projected that the global demand for water will be increased by 55% by 2050. Since climate change will entail complicated and unpredictable impacts, the water demand and the conflicts on water will be influenced too. Accordingly, the competition of different water-using sectors, as well as the competition between the stakeholders of the common water resources, will intensify the risk of local and regional disputes and conflicts and the continued inequality in service availability (UN, 2015).In Iran, the agricultural sector is the largest and most important water user accounting for 92 percent of total water use. On the other hand, water scarcity is the main limiting factor of the crop production. According to the Falkenmark indicator, Iran is at the threshold of the water crisis. Average per capita water figures show that Iran has entered the water stress stage since 2006 (Bijani & Hayati, 2011; Saadati et al., 2012). The imbalance between water supply and demand in Iran has posed water resources management to serious and tough challenges, one of which is the augmentation of water conflict. Water scarcity and inequality in access to water resources are two main causes of water conflict. Thus, water-related violence is an ever-increasing phenomenon. It has been predicted that access to water resources will lead to different wars (Gehrig & Rogers, 2009; Wenjuan et al ., 2009). The city of Damavand has an area of about 188,000 m^2 located 45 km from Tehran, Iran. Its annual precipitation is, on average, 149 mm. Seventy percent of water resources of the agricultural sector is wasted in this city for diverse reasons. The main challenge of the local agricultural sector is the scarcity of water resources and the land use change, leading to the desolation of most rain-fed farms and predicaments for the irrigated lands. This has limited the potential of production and the use of the agricultural lands by the local farmers, thereby resulting in water conflict among them (Jaod, 2017). The complexities of water exploitation system in the studied region and the differences in water users' views and attitudes have rendered the conflict an inevitable phenomenon. Conflict refers to an explicit disagreement between, at least, two interrelated people in which inconsistent goals, concepts, values, and/or beliefs can be detected. Accordingly, water conflict is a term that describes the disputes between countries, states, or human groups over water access (Tulloch, 2009).

Indeed, water-related conflicts are conflicts that take place between two or more regions or groups with different, competing interests in water resources access, allocation, and utilization. Thus, conflict is a social situation where water resource users attempt for more access to resources at a certain time and/or the groups are inconsistent on their interests (OECD, 2005; UNDP, 2012). Obviously, the environment around the mankind will be influenced by such conflicts, resulting in social and ecological changes. When negative conflicts develop and inelastic demand arises for water, its consequences emerge in a tragic way. This tragedy implies that there has been a long-term uninterrupted demand for resources in human systems whilst nature is incapable of replenishing its resources in accordance with this demand. If this trend is not changed, the system is destined to collapse (Bijani & Hayati, 2013). All in all, it can be stated that the suitability and exploitability of the conflict depend on the recognition of its causes and effects.

Causes and effects

Data on water conflict between 2000 and 2009 show that 68% of the conflicts were at the local level and 32% were at the international level (Gebremariam, 2011). At the local level, there may be tensions on water use that can lead to low-level violence and instabilities within the states or regions. The survival and livelihood of millions of poor people, especially in rural areas, rely on the subsistence farming whereas this farming, in turn, depends on water availability. Rising water scarcity, when is combined with low economic development and poor governance, is an indicator of the increased frequency of conflict and instability. Water conflict may have various causes, the most important ones being the socioeconomic factors including increased level of endowment and demand, poverty, production development initiatives, social inequality, marginalization, economic anomalies, and competitive interests at the community level; institutional/political factors including poor governance, the lack of transparency, tensions on borderline displacement, aggressive foreign policy wrapped in national security claims, militarism culture with violence history, and dam construction projects; and environmental factors including water scarcity, population growth and basic human needs, natural disasters, climate change, aquifer degradation, water pollution, exploiting industries, and water users (Gehrig & Rogers, 2009).

The issues that are continually and potentially at the heart of resource conflicts at the national and sub-national levels include ownership of resources, power allocation for the management of resource access and/or development, resource income distribution, and environmental and social damages arising from resource exploitation. Most conflicts at the local level have been resolved by the legislative, regulatory, managerial, and traditional mechanism with no international interventions (Brown & Keating, 2015). In Iran, Bijani & Hayati (2015) 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". Some also relate the water conflicts to such factors as supply shortages, water pollution, resource variability, high demand, low water use efficiency, improper regulatory and institutional networks, improper governance and centralization, water tariffs, lack of financing, unplanned change in water management schedule, inadequate participation of water users, socioeconomic conditions, and inadequate public awareness (AbuZeid & Abdel-Meguid, 2006).

The assessment of the performance of water users associations in Egypt revealed that these associations have been successful in improving crop yield, alleviating conflicts and disputes among the local people, reducing irrigation costs and time, enhancing farmers' relationship with irrigation advisory service personnel, increasing women's participation, and increasing the use of modern irrigation systems by farmers (Hassabou & EL-Gafy, 2007). In a similar study on the performance of water users associations in India, it was found that they exhibited the highest efficiency in two tasks: irrigation water distribution and the resolution of disputes (Joseph, 2001). The last two decades have witnessed extensive studies on water conflict, mainly focusing on the water scarcity, the involved institutions, and the socioeconomic conditions in transnational basins.

However, there has been lower tendency to address water resource conflicts at the local level that is resulted from complicated interactions and feedbacks among a wide range of variables in human and natural systems (Hilmenet al., 2015). In a study in Iran, Valizadeh et al. (2019) found that many environmental dilemmas such as water scarcity originate from human behavior. Also, it was concluded that the findings showed that factors that have been mentioned in social-cognitive theory could be considered for enhancing farmers' water conservation behaviors since the theory provides a more realistic insight into farmers' behaviors with an emphasis on farmers' social and structural contexts. The general goal of this study is the analysis of the causes and effects of water conflict: Evidence from Damavand. To reach this goal, the following specialized requirements were analyzed:

– Determining the extent of conflict among water users;

– Determining the types of conflict and their ranks among water users;

– Determining the Causes of conflict among water users;

– Determining positive and negative effects of conflict among water users.

Methodology

The present study is a relational causal research in nature, carried out by the questionnaire instrument. As the main research instrument, the questionnaire was designed using a review of the literature. The statistical population was composed of all water users (n = 6977) in Damavand County in 2017. After pre-test, the sample size was determined to be 118 people using Cochran's formula. Damavand County is composed of three districts: Absard, Sarbandan, and Rudehen. The sample was taken by proportionate simple randomization technique. To do the research, first drew the conceptual model using the review of the literature. According to this model, a water conflict is composed of two parts: causes of the conflict (Causes → Conflict) and effects of the conflict (Conflict → Effects). Water conflict is situated in the middle of the model. It is affected by various constructs (including climatic, managerial, social, agronomical, and educational causes). These causes have varying (positive or negative) impacts. Cronbach's alpha implies the appropriate reliability of different sections of the research instrument. According to the first model the group of causes and the group of effects are directly related to one another.

In addition, different parts of these causes and effects are correlated to each other. In other words, all sections are interrelated. In the second model, each part of five parts, which were defined via water conflict causes, intensifies the positive or negative impacts and, at the same time, plays a decisive role in their predictions. Cronbach's alpha proved that different sections of the research instrument were reliable. In addition to examining the face and content validity of the questionnaire by a panel of experts and its reliability by pre-test, the convergent validity of the research instrument was evaluated too. The results revealed the accepted level of convergent validity of the research instrument given the fact that average variance extracted (AVE) was ≥ 0.5 and the combined reliability was ≥ 0.7 (Table 1).

Data were analyzed using correlation matrix analysis, structural equations modeling, and Multiple Indicators, Multiple Causes Model (MIMIC). MIMIC models are sophisticated models that require the application of latent variables (constructs) that are predicted or influenced by some overt variables (Schumacker & Lomax, 2010). The LISREL and SPSS software packages were employed as the analysis instruments.

Results

According to the results, the average age of the studied sample was 53 years old. Men composed 91.5% and women composed 8.5% of the respondents. Also, 78.8% of participants had irrigated farms, 18.6% had rain-fed farms, and 2.6% had both irrigated and rain-fed farms. The results on respondents' opinions showed that 42.4% stated that the conflict was at a very high level among water users, 44% stated that it was at a high level, and 13.6% stated that it was at a moderate level. Also, the ranking of conflict types revealed that "inconsistency in users' perspectives on how to address the dispute", "inconsistency in users 'values, norms, and goals", "inconsistency in users' emotions", and "inconsistency in users' mindset" were ranked the first to the fourth. According to the results were analyzed as the causes of the conflict among which the first to third ranks were assigned to "poor knowledge, attitude, and skill of users in water resource management", "poor monitoring system for water use and the transfer and distribution of the local water resources", and "inattention to experts' recommendations about the use of water resources", respectively.

According to the results on the negative effects of water conflict, "the loss of interaction and incorrect judgments on

Table 1. Coefficients of Cronbach's alpha and average variance extracted (AVE)

Construct	Symbol	Number of items	Cronbach's alpha	AVE	CR
Climatic causes	CC	2	0.816	0.612	0.888
Managerial causes	MC	8	0.821	0.558	0.898
Social causes	SC	4	0.876	0.535	0.820
Agronomical causes	FC	2	0.753	0.519	0.805
Educational causes	EC	3	0.815	0.501	0.797
Positive effects	PE	7	0.859	0.621	0.891
Negative effects	NE	7	0.823	0.511	0.818

one another", "discontent with one another", and "the loss of communications and relationships" were ranked the first to third, respectively. According to the results on the positive effects of water conflict, "recommendation of new solutions for the existing problems", "the use of conflict in raising questions and new ideas", and "clarifying the defects, disagreements, and drawbacks" are the first to third most important positive effects of conflict. The matrix of correlation between water conflict causes and effects derived from Pearson's correlation test. It revealed that all coefficients of correlation are significant. In other words, the partial or pair wise correlation of the causes and effects is supported statistically at the 99 percent confidence level. The matrix reveals that educational causes had the strongest correlation with positive effects ($P = 0.00$, $r = 0.63$). Also, climatic causes exhibited the strongest correlation with negative effects ($P = 0.00$, $r = 0.66$).

Since in the real world, any cause and effect acts in the interaction with other causes or effects, so we should check if the relationship between the causes and effects persists under these conditions too. To this end, we developed and tested a structural model. On the contrary to other prevailing statistical methods, structural models enable the researcher to include the measurement errors in addition to considering the relationship between the variables. So, this methodology provides higher accuracy (Schumacker & Lomax, 2010). To analysis the fitted model, we first need to check the appropriacy of fit criteria. Table 2 shows the overall fit criteria for both models. Therefore, the theoretical structure that was assumed for the models is confirmed. This means that the field data also confirm the conceptual model designed for this research.

Now that the overall forms of both models are confirmed, we need to check if the measurement and structural models are statistically confirmed. In other words, are the models valid and reliable? The validity and reliability of the structural equations models are evaluated by t-statistic and R^2. According to Table 3, these two statistics show that the overt variables could well measure the latent variables.

The values of standard factor loads presented in Table 3 and Figure 1 display that among different cause of water conflict, climatic causes were the most effective factor exhibiting a factor load of 0.94. R^2 of this variable shows that it accounted for 88% of total variance of the model and the remaining 12% is related to the effect of this variable on factors or variables not included in the model. Also, it was highly correlated with the agronomical causes.

The managerial factor with a factor load of 0.87 was the second most effective group among the causes. R^2 of this factor shows that it captures 75% of the variance and the remaining 25% is related to the effect of this factor on factors or variables not included in the model. According to R^2 for the social factor, it accounts for 37% of total variance and the remaining 63% is associated with the impact of this factor on other fac-

Table 2. Fit criteria for the structural model of water conflict causes and effects

Fitting index	Optimum level	Structural model	Integrated structural model
Chi-square	–	7.02	11.30
DF	–	6	4
Root mean square error of approximation (RMSEA)	< 0.08	0.02	0.07
Root mean square residual (RMR)	Near zero	0.01	0.01
Standardized root mean square residual (SRMR)	Near zero	0.01	0.01
Goodness of fit index (GFI)	≥ 0.9	0.99	0.98
Adjusted goodness of fit index (AGFI)	≥ 0.9	0.97	0.93
Normed fit index (NFI)	≥ 0.9	0.99	0.99
Non-normed fit index (NNFI)	≥ 0.9	0.99	0.97
Confirmatory fit index (CFI)	≥ 0.9	0.99	0.99

Table 3. Factor loads, structural coefficients, and the criteria for their fit or significance in the structural model

Latent variable	Overt variables	Factor load	Standard error	t-statistic	R^2	Composite reliability (CR)
Conflict C	CC	0.94	0.12	15.82	0.88	0.85
	MC	0.87	0.32	13.42	0.75	
	SC	0.61	0.41	12.11	0.37	
	FC	0.79	0.62	10.72	0.62	
	EC	0.73	0.04	15.90	0.53	
Conflict E	NE	0.95	0.41	14.74	0.90	0.81
	PE	0.91	0.30	16.46	0.82	

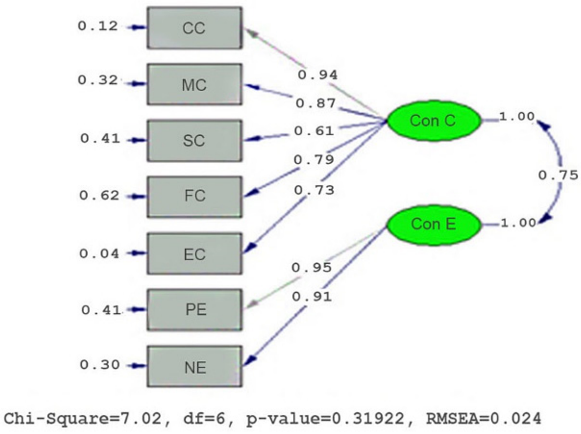

Fig. 1. Values of factor loads and standard structural coefficients for the model Conflict 1

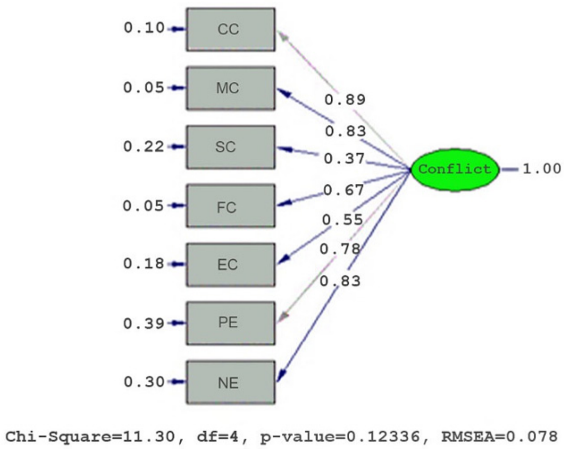

Fig. 2. Values of factor loads and standard structural coefficients for the model Conflict 2

tors or variables not included in the model. As R^2 shows, 62% of total variance in the model is captured by the agronomical factor and the remaining 38% is related to the impact of this factor on factors or variables not included in the model. Finally, the educational group of causes with the lowest R^2 of 29% among all conflict causes. Although participants gave the lowest importance to these causes, they were considered important because of their proper correlation with other causes. CR revealed that the causes included in the model could altogether capture 85% of water conflict causes. As is evident in Table 3 and Figure 1, the negative effects had the factor load of 0.95 and were more important than the positive effects. The negative impacts of conflict are important in the sense that they had the highest correlation with the five groups of causes. The factor load of the positive effects of conflict was estimated to be 0.73. The model could, altogether, account for 81% of the effect of water conflict. The equation of the structural part of the model can be written as below. It indicates that the causes mentioned for water conflict can directly capture 60% of the variance of water conflict effects. This equation is statistically significant at the 95% confidence level.

Conflict E = 0.75 Conflict C, Error var = 0.40, R^2 = 0.60

Although the model Conflict 1 can be used to illustrate the direct effects of water conflict causes and effects on one another, but the question is, "given the direct relationship between the causes and effects of water conflict, is it possible to predict the positive and negative effects by the use of the fivefold cause groups?" The answer will show to what extent we can manage the positive and negative effects directly by the control of the fivefold group. A second model was developed to test it and answer the question (Figure 2). This kind of models is called Multiple Indicators, Multiple Causes Model (MIMIC) in structural equations modeling. The model Conflict 2 tries to predict the effects of conflict (as the dependent, latent variable of the model) with the use of the fivefold group of the factors (as the predictive variables). Table 4 and Figure 2 contain the structural coefficients, factor loads, and the fit criteria for the measurement and structural model Conflict 2. According to Table 4, conflict cause variables played a significant role in predicting the positive and negative effects.

The following equation that is the structural equation for the prediction of the water conflict effects reveals that the

Table 4. Factor loads, structural coefficients, and their fit criteria or significant in the model Conflict 2

Latent variable	Variable type	Variables	Factor load	Standard error	t-statistic	R^2
Water conflict	Predictor	CC	0.89	0.10	9.00	0.59
		MC	0.83	0.05	6.41	
		SC	0.37	0.22	1.59	
		FC	0.67	0.05	5.32	
		EC	0.55	0.18	4.01	
	Overt	PE	0.78	0.39	11.39	0.61
		NE	0.83	0.30	12.26	0.70

causes could account for 59% of the variance of water conflict effects. This equation is statistically significant at the 95% confidence level.

Conflict 2 = 0.89CC + 0.83MC + 0.37SC + 0.67FC + 0.55EC; Error var = 0.406; $R^2 = 0.59$

Discussion and Conclusion

According to the results, water conflict can be attributed to different causes categorized into interdependent climatic, managerial, social, agronomical, and educational factors, among which the climatic factor was found to include the most important causes. Climate change is currently responsible for the occurrence of events like droughts that hinder agricultural activities or even living in some regions, resulting in the migration of rural people. Climate change has caused the deficiency of water resources and has created water conflicts and violence among farmers in most regions. This finding is in agreement with (Gehrig & Rogers, 2009; Bhusal & Subedi, 2014; UN, 2015).

Managerial factor was found to be the second most important factor in accounting for water conflicts. The inability to govern and manage water resources has created inappropriate conditions for the exploitation, storage, transfer, distribution, and use of water resources, causing conflicts between farmers. Therefore, poor governance, inefficient institutions and, overall, poor management of water resources have aggravated the disagreements and conflicts among stakeholders. The inefficiencies under water conflict conditions can be attributed to the prevalence of traditional and bureaucratic management model. Therefore, given the nature of the water conflicts, which is related to the interrelationship among a large number of farmers, government and other stakeholders, it is necessary to use a suitable model such as participatory irrigation management (PIM) because this model seeks to strengthen the relationships, negotiation and interactions between water users and the government through the participation of farmers in managing water resources and alleviating or eliminating conflicts. This finding is consistent with (Shortt et al., 2004; Hileman et al., 2013).

Social factor has also been recognized as a significant factor in water conflict. Conflict is a social behavior. Social behaviors are determined by two main factors: internal factor came to be known as the personal view on affairs, and external factor or the norms that include the unwritten customs, traditions, and rules. Tribal disputes, different environmental temperaments and issues like land inheritance and fragmentation have reduced the availability of water resources have led to the emergence of different concerns and, in the end, to the intensification of conflicts. The best approach to address these conflicts and disputes is to encourage the negotiation and participation of stakeholders although this is difficult and time-consuming. This finding supports and Gehrig & Rogers (2009) and Gebremariam (2011) 's reports.

Agronomical factor is another parameter contributing to water conflict. Since most water users are smallholders whose livelihoods depend on agriculture. So, given the droughts and the deficiency of water resources, they are struggling to supply the water requirement of their farms. The loss of the cropping area has resulted in the loss of income, more poverty, and the development of water conflict and violence among local farmers. Furthermore, the planting of crops with high water requirement and crops inappropriate for the region, improper planting patterns in the region, the collection, distribution, and transfer of water in traditional way, poor development of modern irrigation system at local level, poor implementation of optimal planting methods, the inattention to conservative farming at local level, and poor implementation of aquifer projects at local level are all among the agronomical factors that are responsible for water productivity of as low as 30–35%, the use of 92% of freshwater resources by the agricultural sector, and the occurrence and aggravation of water conflicts in the studied region. Similar findings have been reported by (Pimentel et al., 2004).

Educational factor had an important role to play in water conflicts. Poor water management and negotiation skills among farmers create conflict among them. The development and implementation of the participatory water resource management programs can improve water users' awareness, attitudes, and skills and can, finally, improve their capability and communication skills and motivate them to contribute in water resource management and establish water user associations. In addition, to empowering water users, these educational courses derive positive impacts out of the conflicts, including finding new solutions to alleviate the negative effects of the conflict and the better management of water resources. These results are consistent with the findings of AbuZeid & Abdel-Meguid (2006) and Hassabou & EL-Gafy (2007).

According to the results and global experience, it is therefore recommended to develop and implement participatory irrigation management (PIM) to control the managerial, social and educational causes based on their nature and to reduce the conflict and mediation among farmers. It should be noted that the adoption of PIM will improve and clarify the communication structure and will reduce the conflicts among the stakeholders and the need for the intervention of governmental officials in local disputes. Also, the establishment of water users associations can help to supply the financial resources required for the maintenance of the water transfer systems and facilities in some regions. On the other hand, the conflict between the farmers can be reduced by transparency in water availability and users' self-control (Joseph, 2001; Regner et al., 2006).

Since water conflict is rooted in climate change, the development and deployment of CSA model can be an agro-climate approach to adapt the agricultural sector to the climate change and mitigate the negative effects of water conflict because this approach is capable of ensuring food security, accomplishing the goals of sustainable (economic, social, and environmental) development, adapting farmers to climate change, and empowering individuals to cope with these changes (FAO, 2017).

The present study reveal that the management of the causes and effects of water conflict requires an empowering and mediation approach that considers both causes and effects simultaneously because water conflict has a systematic and complex nature whose management requires an integrated, interactive approach. This is supported by Robbins (2006).

References

AbuZeid, K. & Abdel-Meguid, A. (2006). Water conflicts and conflict management mechanisms in the Middle East and North Africa Region. In. Egypt: CEDARE.

Bhusal, J., K. & Subedi, B. P. (2014). Climate change induced water conflict in the Himalayas: A case study from mustang, *2(2),* 585-595.

Bijani, M. & Hayati, D. (2011). Water conflict in agricultural system in Iran: A Human ecological analysis. *Ecology and Environment Science*, *2(2),* 27-40.

Bijani, M. & Hayati, D. (2013). Application of environment attitudes for analyzing water conflict: The case of Doroodzan Dam irrigation network. *Iranian Agricultural Extension and Education Journal*, *9(1).* In Persian.

Bijani, M. & Hayati, D. (2015). Farmers' Perceptions toward Agricultural Water Conflict: The case of Doroodzan Dam irrigation network, Iran. *Journal of Agricultural Science and Technology (JAST)*. *17 (3),* 561-575.

Brown, O. & Keating, M. (2015). Addressing natural resources conflicts working towards more effective resolution of national and sub-national resource disputes. In: Chatham House, The Royal Institute of International Affairs.

FAO (2017). Climate-smart agriculture. *Source book.* Summary. Rome.

Gebremariam, A. G. (2011). Multidimensional approach to local water conflicts, a study based on the afar region of Ethiopia. A doctoral thesis, Loughborough University.

Gehrig, J. & Rogers, M. (2009). Water and conflict, incorporating peace building into water development. In: Edited & C. S. m. by Dennis warner, and Tom Bamat (eds.): Catholic Relief Service.

Hassabou, A. H. M. & EL-Gafy, I. K. (2007). Assessment indicators for water users association in Egypt. In: Official Publication of the European Water Association.

Hileman, J., Hicks, P. & Jones, R. (2013). Building peace through integrated water resources management, Conceptual foundations for a revised approach to water resources development. In: University of California. Global Water Initiative.

Hilmen, J., Hicks, P. & Richard, J. (2015). An alternative framework for analyzing and managing conflicts in integrated water resources management (IWRM): linking theory and practice". *International Journal of Water Resources Development.* doi:http://dx.doi.org/10.1080/07900627.2015.1076719

Jaod (2017). Agriculture perspective of Damavand City. Jihad-e Agriculture Organization. Damavand, Iran. In Persian.

Joseph, C. J. (2001). Beneficiary participation in irrigation water management: The Kerala Experience, Discussion Paper.

OECD (2005). Mainstreaming Conflict Prevention: Water and Violent Conflict.

Pimentel, D., Berger, B., Filiberto, D., Newton, M., Wolfe, B. & Nandagopal, S. (2004). Water resources: agricultural and environmental issues. *Bioscience, 54(10),* 909-918.

Regner, J. H., Salman, A. Z., Wolff, H. P. & Al- Karablieh, E. (2006). Approach and impact of participatory irrigation management (PIM) in complex. Paper presented at the Conference on International Agricultural Research for Development, University of Bonn.

Robbins, S. P. (2006). Organizational behavior. 11th edition: Prentice Hall Inc.

Saadati, C., Ansari Ardali, E. & Akbari, M. (2012). Irrigation advisory services: Basic solution to manage challenges of agricultural water resources. *Taavan and Village Magazine*, *3,* 205-227.In Persian.

Schumacker, R. E. & Lomax , R. G. (2010). A beginner's guide to structural equation modeling, 3rd edition. New York: Routledge Academic.

Tulloch, J. (2009). Water conflict: Fight or flight? Allianz.

Valizadeh, N., Bijani, M., Hayati, D. & Fallah Haghighi, N. (2019). Social-cognitive conceptualization of Iranian farmers' water conservation behavior. *Hydrogeology Journal, 27 (4),* 1131–1142. DOI: 10.1007/s10040-018-01915-8

UN (2015).The United Water Development Report, Water for a Sustainable World. Retrieved from: www.un.org

UNDP (2012). Toolkit and guidance for preventing and managing land and natural resources conflict. Retrieved from: www.undp.org

Wenjuan, N., Huimin, W. & Lei, Q. (2009). A framework of transboundary water conflict model based on qualitative simulation of behavior. Paper presented at the International Conference on Engineering Management and Service Sciences. Retrieved from: www.ieeexplore.ieee.org

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