# The Role of Agricultural Extension towards Water Conflicts in the Catchment Area of Urmia Lake, Iran

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**Abstract:** Within the past decade, the utilization of river flows by dams and affiliate networks in the industrial, agricultural, and urban sectors has resulted in the critical status of Urmia Lake and the reduced incoming water flow. A major part of this crisis has social dimensions. The six meters decrease of the Urmia Lake's plane within the last 13 years makes the need for the nation's determination to save this critical ecosystem clear. With the lake's drought the province will be deserted, the soil will become salty, leading eventually to the inexistence of plantation and the destruction of the green province of Azarbaijan. Therefore million gallons of the lake's salt will pollute the environment of the surrounding area with salty dust and will destroy agricultural lands and gardens. This study intends to analyze the role of agricultural extension in reducing water conflicts in the catchment area of Urmia Lake by means of POET model. In this regard, the following research questions are proposed. 1. What organizations and sectors encounter conflicts regarding water utilization in the catchment area of Urmia Lake? 2. What are the dimensions of water conflict in this area? 3. Can agricultural extension, as an intervening factor, contribute to the reduction of water conflicts over Urmia Lake? The result of this study showed that the most important water conflict is between water stakeholders and the government, and the best solution to this conflict means shifting from governmentality to governance.

**Key words:** Water conflicts, Urmia Lake, Agricultural extension, Compatibility.

## 1. Introduction

Urmia Lake, the largest permanent pond in West Asia, is located in the west part of the Iran plateau. In this lake, 27 species of mammals, 212 species of birds, 41 species of reptiles, 7 species of amphibians, and 26 species of fish constitute the wildlife of the plateau at the present. One of the most important international ponds that are recently exposed to the danger of destruction due to different reasons such as the implementation of civil projects is Urmia Lake. The destruction of the Urmia Lake started a decade ago and is getting worse day after day (Figure 1). To the extent that, presently, we expect the drought of lake Urmia within few years.

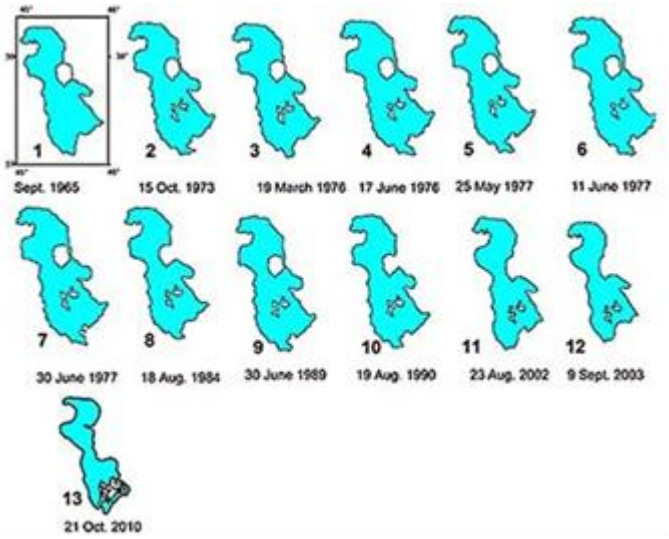


**Figure1.** Reducing the area of the Uromia lake in 1965 - 2010

Conflicts over water utilization in different parts of Urmia Lake, dam construction, deep and semi-deep wells, etc. have made the Lake conditions critical. In this regard, water conflicts in various sectors of agriculture, industry, and drinking water have always caused serious damage to water supplies. Through exerting an influence on attitudes and knowledge of the stakeholders, agricultural extension has an influential role in the decrease of these conflicts and, eventually, in the restoration of Urmia Lake. Today, the crisis of Urmia Lake has grown beyond its national and regional importance, due to its impact on the environment and, thereby, requiring public assistance and cooperation. This study is an attempt to regionally analyze the role of agricultural extension in reducing water conflicts in the catchment area of Urmia Lake.

Since human attitude influences behavior and performance, the purpose of this research is investigating the role of the social conflicts in water obtaining in different consumption parts, and its influence in Urmia Lake's water level decreasing.

The term "water exploiting conflicts" describes the disputes and contentions related to the access to water resources in agriculture, industry, and drinking water.

On a global scale water conflict (water exploiting contestation) is a general and universal occurrence. In the last fifty years, 1831 great conflicts have happened, such as 21 military conflicts (Bijani et al., 2013). Over 92% of the whole water resources in Iran is exploited by agriculture. (Khajepour, 2013) (Table 1) Based on Iranian law, water resources (rivers, lakes, seas…) are public properties and the government is responsible for them. (Abraham, 2000)

**Table 1.** Water consumption in various sectors

| Section | Annual water consumption percent | Average world consumption |
|---|---|---|
| Agriculture | 92 | 70 |
| Drinking water* | 6 | 10-12 |
| Industry | 1.5 | 20 |
| General and park usage | 0.5 | - |

Source: (Alasty, 2013)

*6 percent usage of drinking water doesn't mean that it is normal, the annual per capita is 75 liters daily for everyone, and in Iran it is 220 liters. (Alasty, 2013)

The reason of the reduction of the Lake's water level is the reduction of input water into the Lake (chart1). (Input swash plus raining) than the output swash (that is just vaporization.)

If this continues, besides the death of Urmia Lake we will face the destruction of the Lake's environment. One of the primary steps to recover the Lake is to investigate the behaviors and perspectives of governmental and personal beneficiaries related to Urmia Lake's ecosystem and their consequences.

The subject has an important effect on stating the role of beneficiaries and editing and performing the precise management programs.

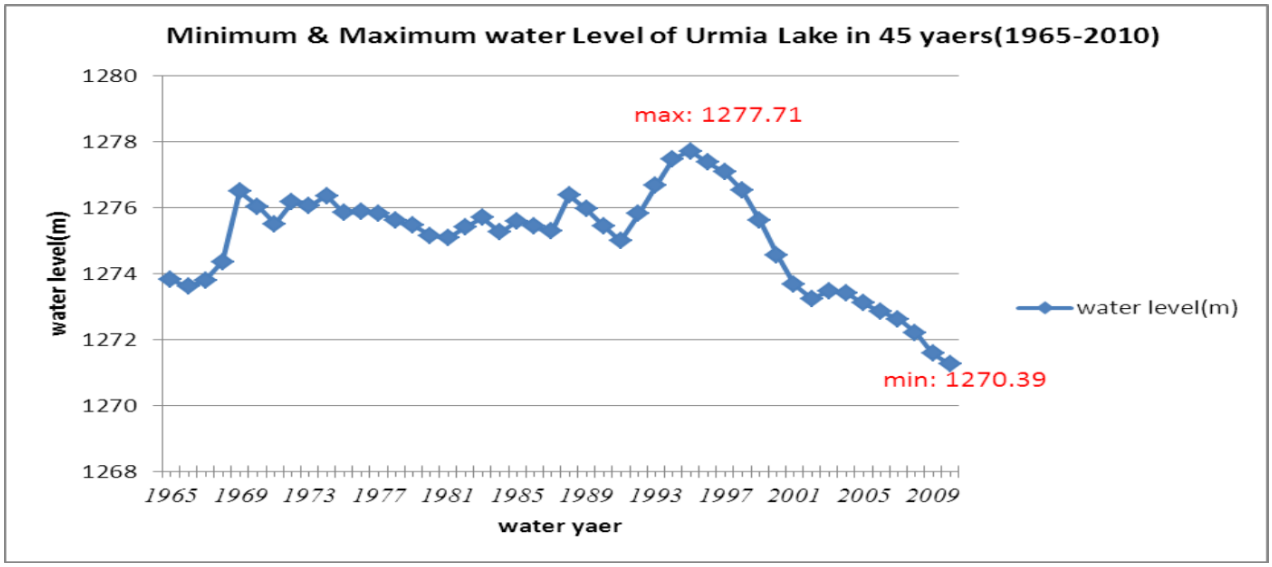


**Chart1.** Water level of the Urmia Lake

## 2. Materials and Methods

### 2.1. Study Area

Urmia Lake with approximately 5,000–6,000 km$^2$ is the largest lake in Iran. Urmia Lake is located in the northwestern Iran and in the province of Azerbaijan (Figure.2). That water is entremely salty and supplied by the lakes Zarinroud, Siminroud, Gohar, Barabdouz, shahrchai, Nazlou and Zoula. Among these lakes, Ajichai runs through Neojen salty sediments in Tabriz and has important role in transporting salt in to the lake. Urmia Lake is the biggest lake in Iran, the second salt lake in the word and the biggest permanent basin in Western Asia and the most important pond in Iran (following Anzali swamp). That is considered Iran's and local natural habitat of animals (Department of environment, 2013).


**Figure 2**: Urmia lake position

## 2.2. Research Method

This research was conducted based on the framework of the applied approach with the methodology of a descriptive research method. Data were collected through library research.

## 3. Results and Discussion

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.

In this article, water conflicts between farmers; small watershed lake is studied with POET model.

The POET model is one theory found within the Human Ecological approach to studying social phenomena. The Human Ecological approach assumes that society is a natural system made up of man, his environment, and the processes that allow man to adjust/adapt to his environment. This adaptation is not achieved individually, but is accomplished by the collective population through social organization or a division of labor. This social organization of society affects other spheres of social life, which in turn influences man's environment (Hawley 1981).

In its most basic form, Population (P), Organization (O), Environment (E), and Technology (T) features of a society are believed to shape the society, both directly and indirectly by influencing each other. Figure 3 displays the basic POET model.


**Figure 3**: POET model

Note: Some conceptualizations of the POET model also include a fifth concept, Culture, in the mode (Weinstein and Pillai, 2001).

Nowadays, most of arguments about natural resources and environment focus on humans. Focusing on relationship between humans and environment is an important factor in human life equations. Therefore, one of the most important sections is focusing on conflict studies related to using and managing natural resources such as water among beneficiaries. One of the most important parts of water conflict in the agricultural sector in Iran is linked to the lack of sufficient attention to this subject. In fact, considering humans as only the consumers and users is a big mistake which is happening in using fresh waters resources (Wolters, 2012).

The POET model has some obvious limitations such as the lack of scale considerations; the way it deals with the effects of growth on the size of the ecosystem at stake, including its relationship with carrying capacity; as well as the role played by culture, power, and individual agencies. In addition, it was embedded in a dualistic vision between the natural environment, i.e., E, and human environment components, i.e., P, O, and T, and was thus labeled as anthropocentric

(Dunlap et al. 1994). All of this made it difficult to address issues such as the role played in sustainability by the existing stocks and flows of information, biodiversity, and pollution from different scales of human action. For instance, the loss of biodiversity is not only a loss of a natural resource, but also a loss of information, which affects the way human-natural communities organize themselves, create co-adaptive institutions, and construct natural-human hybrid associations. Hence, a more hybrid relational co-evolutionary synthesis of social-ecological systems is needed (Freese, 1997).

To deal with such challenges and avoid oversimplification, we suggest a more elaborate model for the synthesis of and communication and learning about sustainability (Figure. 4). Emerging from the reflections of the new ecological sociology, the social-ecological system (Tàbara, 2003) can be understood as consisting of four main components: structure (S), energy and resources (E), information and knowledge (I), and social-ecological change (C). Structure includes the stable set of system-governing rules and conditions that a particular set of social-ecological relationships or agents use to arrange their behavior and adapt to the changing environment. These rules and conditions are conscious or unconscious, formal or informal, and human created or not human created. Energy comprises the whole set of resources, including biodiversity, that is needed by the agents or the social-ecological system of reference to pursue their goals and/or perform their functions. Information and knowledge encompass not only those types of information that are represented, stored, and communicated in human languages and artifacts, but also those stocks of information and knowledge embedded in natural systems and biodiversity that have been acquired by evolution. Change encompasses those stocks and flows of driving forces and conditions that transform the whole social-ecological system and that emerge from the accumulation of the effects of the agents. Change is not only the result of transformations within the natural environment, e.g., by the use of energy, but also that of changes in the use of social and information systems, e.g., the loss of local knowledge as a result of the expansion of computer-based information tools. Whenever the change in the social-ecological system is too fast or too large for the purposeful agents of the system to adapt to it, the system can enter into an irreversible situation of unsustainability. The sustainability of the total social-ecological system is only possible if a certain degree of complexity and diversity is ensured to allow it to adapt to changes and provide the multiple services that agents of different scales and natures need to maintain their functioning. In a social-ecological system, change must always navigate between thresholds that are often given by the quantitative and qualitative carrying capacities of the system in relation to its knowledge systems, resource availability, and institutions to ensure the system's sustainability. Thus, if institutions grow beyond a certain threshold, they may also become dysfunctional in terms of sustainability.

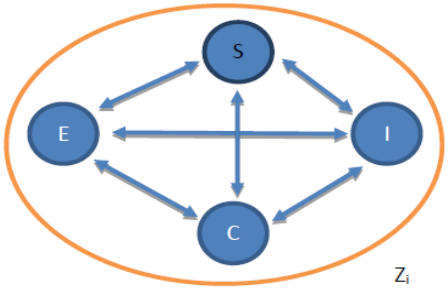


**Figure 4**: The social-ecological system as represented by the SEIC model (Tàbara ,2003). S = structure and ruling institutions, E = energy and resources, I = information and knowledge, C = social-environmental change, and $Z_i$ = size of social-ecological system i.

## 4. Conclusion:

Agricultural water conflicts in Iran shows there are different goals among stakeholders, especially between farmers and the government. Since regional water experts as government officials, are responsible for water management to assess their views about water conflict (Bijani et al., 2013).

Since agriculture, industry, and the life of Urmia Lake affect one another as well as the people's prospective influence on their effort to revive Urmia Lake, it is important to appoint the role of social contestations and oppositions in the process of decreasing the water level of Urmia Lake that hasn't been mentioned yet. The study on the prospective of the responsible managers of water distributions in agriculture department and industry and also its exploiters to the method of using water in that area to save Urmia Lake is necessary. With identifying the prospective of beneficiary people in water distribution, the blind spots and strong points can be identified to eliminate shortcomings and blind spots and strong points can be helpful in that way .

Agricultural extension, as a mediator, can play an effective role in the control and reduction of conflicts over water utilization in agriculture through influencing the stakeholders. However, macro-level management along with the selection of appropriate strategies in different sectors, including agriculture plays an important role in the restoration of Urmia Lake. The identification of the intervening role of promotion and extension in attracting the participation of stakeholders in the restoration of the Lake may be associated with difficulties in the early stages. However, this can reveal some hidden aspects of the effects that different groups have on the wetland and, thereby, the influence and real significance of the above-mentioned measure will be determined. In this way, planning is required for the structured participation of stakeholders in the development and implementation process of the wetland management plan. Finally, some suggestions have been proposed for the most possible effectiveness of agricultural extension.

Studies in Iran show that farmers prefer water management in the form of governmentality and experts prefer governance (Yazdanpanah et al., 2012; Bijani and Hayati, 2015). This result shows that the majority of farmers that have their own water management are elusive. Here extension the role of intervention with its flexibility in their original goals have played well so that the management of state governance and participatory government to be led. On this basis, the establishment, strengthening and supporting WUAs (Water Users Associations), training farmers and experts, participation and cooperation of farmers in water resource management and strengthening of the environmental and resources, solution would be to reduce conflicts on the increasing use of water in the agricultural sector. Undoubtedly, agricultural extension can be critical role in this area.

We propose that urban ecosystems cannot be understood fully by applying only ecological methods and models developed in less human-dominated ecologies. Nor do we propose that traditional social science dichotomies or continuums of urban-rural structure have sufficient analytical power. An urban ecosystem is a separate kind of biosocial system that shares certain theoretical similarities with other types of human ecological systems but also exhibits specific, unique properties. For example, although we may use universal ecosystem theories to study an alpine bog or coastal wetland system, our interest is to understand how these ecosystems are unique variations of common ecological themes. Similarly, this same approach to urban ecosystems avoids the notion of "human impact" favored by many biological scientists at one end of the spectrum and the "human centered approach" favored by many social scientists at the other. Our interest is to treat this unique type of ecosystem in its own right as neither an aberration nor an evolutionary end point of nature.

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