

WATER CONFLICT IN AGRICULTURAL SYSTEM IN IRAN: A HUMAN ECOLOGICAL ANALYSIS

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Abstract-Utilizable fresh water for using in agricultural sector is very scarce especially in Iran. That shortage is the cause of conflicts among stakeholders. They also have some impacts on the environment. The intention of water conflict in this article is a term describing conflicts among water stakeholders in agricultural sector especially between farmers and government. 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 from these conflicts. The goal of this article is investigating on the fresh and surface water conflicts of agricultural sector and its reasons and consequences in the background of human ecological analysis conflict in agriculture with emphasis on agricultural sector in Iran. Research methodology that used is descriptive with collecting information through documentary studies. This article, tries to investigate theoretical background of conflict management and POET model for analyzing human ecological effects of water conflicts especially in agricultural sector in Iran. Water conflict in agricultural sector of Iran has been described in three turning points in the last current decades. The result of this study shows that the most important water conflict is between water stakeholders and the government and the best solution of this conflict is transfer from government to governance. Description of this subject discussed and explained in details in this article and some executive recommendations have been presented at the end of the article.

Keywords: Water conflict, Human ecological analysis, Environment, Agriculture, POET model, Iran.

1. Introduction

Water is a valuable resource which frequently crosses political borders; the right to exploit water resources has often come into dispute. The literature on this subject has extensively speculated on the causes of international and interior national water disputes [20].

Fresh water constitutes only 2.5 percent of the global water resources. This percentage shrinks as the contamination and depletion of this resource becomes more acute. Today, to the old challenges of contamination and depletion, new pressures such as the Global Climate Change (GEC) are added [50, 24].

Rapid population growth, expanding urbanization, unsustainable economic practices and technologies come to mind at first hand as some of the most important driving forces of the global water challenge. Figure 1 shows the evolution of global water consumption for the period 1900-2025 according to main economic sectors; agriculture, urban, industry and reservoirs. When the impacts of unsustainable human practices on other resources such as land and cultural-natural heritage are taken into consideration in relation with the growing pressures on the world's water resources, the global

water challenge becomes more difficult to define and combat [24]. In Iran, The greatest amount of water usage (83.5 bcm or 92.8 percent) is by the agricultural sector. Of this amount, about 50 percent is exploited from surface water resources and another 50 percent from groundwater [1]. Over 80 percent of water is wasted. The main reason in this regard refers to none using of advanced irrigation technologies [4]. One of sectors of this mismanagement is about conflict management among water stakeholders in agriculture that has an important impact on the environment.

Water supply in Iran consists of both surface and groundwater resources. Available data for Iran's freshwater resources are presented in Table 1. As is seen in this Table, the average renewable water is 130 billion cubic meters only. 94.25 percent of water withdrawal is used for agricultural purposes, 4.57 percent for domestic use and 1.0 percent for industrial use. From another perspective, Iran can be considered as a country facing water stress. Given the high population increase and recent persistent drought conditions, Iran's average annual supply of renewable freshwater per person fell

from 2,254 m³ in 1988 to 1,950 in 1994, and the estimated figures for the year 2020 is 1,300 m³, respectively [3,17] [Table-1].

The rapid development of social economy has caused sustained pressures on natural water resources system. That leads to many severe consequences, one of which is increasingly frequent and fierce water conflict. From the world wide range, water conflict has been a universal phenomenon. According to the world water resources evaluation report of united nation, in the past fifty years, water problems induced 1831 great conflict events in the world, among which 21 events had evolved into military conflicts [55, 52]. In fact, in 1995, Ismail Serageldin, vice-president of the World Bank, has prophesied that many wars of the 20 century were caused by oil, but water would be the source of wars in the 21 century [52]. Two forms of conflict over water resources are likely to occur as a result of environmental degradation and depletion. These are 1. Competition over the right to exploit water resources and 2. Disagreements over the importance of protecting and cleaning up the environment [20]. The intention of water conflict in this article is a term describing conflicts between water stakeholders in agricultural sector especially between farmers and the government.

Water is a vital resource. Not only a font of life, it often to bring people together. But access to water is highly unequal between and within countries stakeholders. Much of the world's population lives in places where demand for water exceeds supply, or poor quality limits its use. Scarcity of water and inequities in access, use, and decision-making can threaten life itself, diminish the quality of life, and impede integral human development. Water scarcity and inequities are also risk factors for violent conflict. Water-related violence is already common in many parts of the world and is generally expected to increase in the years ahead [16]. In this regard Ban Ki-Moon (2009) said: "Too often, where we need water, we find guns instead" [16].

There is little doubt that environmental problems will be one of humanity's major concerns in the twenty-first century, and it is becoming apparent that sociologists can play an important role in shedding light on these problems and the steps that need to be taken to cope with them. While the study of environmental issues is an inherently interdisciplinary project, spanning the natural and social sciences as well as humanities, the crucial role of the social sciences in general and sociology in particular are increasingly recognized [13, 6].

Hardin's (1968) discussion of the "tragedy of the commons" points out the dilemma that human societies face as population and demand outstrip the supply of natural resources such as land, forests, and minerals. The tragedy is that the commons system works as long as human demands on the commons do not exceed the ability of nature to replenish itself; however, when demands do exceed the ability of the commons to replenish itself the system breaks down and will eventually collapse [31].

The historical response to the tragedy of the commons has been privatization of land and resource ownership. Shiva (1991), however, points out that the transition from natural resource ownership held in common to the contemporary private property system is a process often filled with conflict. Furthermore, some natural resources are not easily privatized, such as rivers, oceans, the atmosphere, and wild animals [42].

Namboodiri (1988) stated that the human ecological approach is a powerful perspective in the analysis of power relations and conflict processes. The human ecology approach is applied throughout this study to organize an attempt to determine how key variables affect the likelihood of conflicts over natural resources [33].

The goal of this article is investigating on the fresh and surface water conflicts and its reasons and consequences in the background of human ecological analysis with emphasis on agricultural sector in Iran. In this regard, the study tries to achieve below objectives.

1. Analysis of human ecological paradigms and some main theories toward using of water resources,
2. Analysis of more remarkable conflict theories regarding to use water recourses,
3. Investigation toward water conflict consequences on human ecology aspects and
4. Investigation toward water conflict condition and its evolutionary trend in agricultural sector in Iran.

2. Material and methods

Descriptive research method with collecting information was used to achieve the above objectives. Actually, this article is the result of archive study and inferred from literature review of related studies and researches.

3. Theoretical Background

According to Buttel and Humphrey (2005), there are five basic epistemologies in environmental sociology [Table 2] [7]. In practice, this means five different theories of what to blame for environmental degradation, i.e., what to research or consider as important. In order of their invention, these ideas of what to blame build on each other and thus contradict each other [Table-2].

3.1. Development of human ecology

Ecology derives from the ancient Greek words "*oikos*" and "*logos*" and means "science of the habitat". Ecology as a discipline was technically born when Ernst Haeckel (1834-1919) used the word "oekologie" in 1866 to describe the study of an organism's relationship to its environment [30]. Ecology was revolutionary at this time because it encouraged interdisciplinary within the sciences it created a bridge between the physical sciences and the biological sciences in order to study systems of both biotic and abiotic factors. Human ecology is the interdisciplinary or trans disciplinary study of the relationship between humans and their natural, social, and built environments [30,41].

People-environment relations are multi-dimensional and complex. No single discipline or perspective can understand and explain these relations in a comprehensive way. Collaboration and coordination of contributions is necessary. However, the study of people-environment relations in general and human ecology in particular, still remains divided between the social and natural sciences as well as between the theoretical and applied approaches in each of these sciences. Today the main obstacle that hinders an integrated framework is the compartmentalized disciplinary focus of scientists and professionals who do not share definitions and interpretations but adopt exclusive interpretations. There is a need to replace the addition of multiple disciplinary contributions by interdisciplinary approaches such as human ecology [30,42].

The interrelations between organisms and their surroundings influence the volume and quality of the available local resources, the discharge of waste products and the creation of new resources. In addition, organisms are components of ecological systems and, therefore, they influence the living conditions of other species [29,30].

Environmental sociology is the study of the reciprocal interactions between the physical environment, social organization, and social behavior. Within this approach, environment encompasses all physical and material bases of life in a scale ranging from the most micro level to the biosphere. Development of human ecological studies helps in this regards. Nowadays, most of arguments about natural resources and environment focus on human. Focusing on relationship between human and environment is an important factor in human life equations. In this way, one of the most important sections is focusing on conflict studies towards using and managing natural resources such as water among beneficiaries. One of the most important part of water conflict in agricultural sector in Iran linked to lack of sufficient attention to this subject. Consider human as only consumer and user is a big mistake which is happen in using fresh waters resources. This mistake has many bad results and causes some water conflicts among farmers and other stakeholders in agriculture.

3.2. Theoretical perspectives on natural resources

Traditional Malthusian theory suggests that -due to population growth- human consumption needs will eventually exceed the availability of natural resources, particularly food, causing a myriad of negative social outcomes like war, disease, and famine. Violence and war, from the Malthusian perspective, are "positive checks" that serve to reestablish the equilibrium that is disrupted by scarcity caused by population growth. According to Price (1998), Malthus' theoretical statement was, simply, that population expands to the limits imposed on it by subsistence. The inevitable results when it reaches those limits are poverty and disaster. The traditional Malthusian perspective has been criticized for neglecting the role of technological

innovation and other factors in increasing the carrying capacity of the world [20].

Classical economics theories on economic behavior and natural resources have emphasized the creation of markets as the key to balancing positive development and over-consumption. Critics of classical economics have pointed out that as natural resources become scarcer and their value goes up, the financial incentive to further exploit those resources also increases to the point where the result is often extinction, disappearance or devastation [20].

Following from that criticism, theories in the Marxist tradition have emphasized the conflicts of interest between groups with more or less control and ownership of natural resources. These approaches argue that free markets create such great disparities between the "haves" and the "have-nots" that social conflict is inevitable [20].

Another perspective on natural resources is contemporary ecological positions. Ecologists have been highly critical of the human exemptionalists' belief that economic and technological development overcomes our dependence upon natural resources. Shiva (1991) describes the belief that technology reduces human dependence on natural resources as a myth that overlooks the "long and indirect chain of resource utilization which leaves invisible the real material resource demands of the industrial processes.". The "new ecological" approach (Dunlap and Catton, 1979), which has arisen in the last half century and gives more importance to the natural environment as a salient factor in social development, argues that there are limits to growth and that human societies cannot rely on market adaptations to overcome these limits [42].

Human ecology is primarily interested in building a conceptual framework for studying the relationship between humans and the environment, with an emphasis on the interactions between populations, social organization, environment, and technology [33].

It seems for solving the crisis of water conflict in Iran; with attention to growth of population and water stakeholders the definition of water ownership should be revised. Then with regard to virtue of contemporary ecological theory and emphasis on the role of human in this background, we must rectify the organization of water ownership. In the continuation of this article, we will argue more in this regard in the part of evolutionary trend of water conflict in agricultural sector of Iran.

3.3. Conflict theories

Conflict theory can be used to explain the interactions between societies during times of turmoil and change (i.e. revolutions, strikes or everyday debates) [46].

Conflict theories are perspectives in social science which emphasize the social, political or material inequality of a social group, which critique the broad socio-political system, or which otherwise detract from structural functionalism and ideological conservatism. Conflict theories draw attention to power differentials, such as

class conflict, and generally contrast historically dominant ideologies [46].

3.4. Models of conflict theories

There are three models of conflict theory. They are presented according to [Table-3].

What we can see in the agricultural water management in Iran is a complex mode that is difficult to describe what kind of above theories confirm it. According to had described before, government is manager of water recourses in Iran now and controls and distributes it between stakeholders. Therefore we can say this trend is according to Marxism and Parsonian conflict theories. In this way government is owner and controller of water in all of dimension and water stakeholders have no important role in this management. Therefore, they have no efforts to solve conflict toward water between themselves and government. All that responsibility is for government and farmers are just users.

4. Discussion: Water conflict and agricultural water conflict

Water conflict is a term describing a conflict between countries, states, or groups over an access to water resources [48, 26, 54]. The United Nations recognizes that water disputes result from opposing interests of water users, public or private [49]. Water-related conflicts are conflicts arising between two or more parties holding competing claims over a water resource, its allocation, or its use [35].

A wide range of water conflicts appear throughout history, though rarely are traditional wars waged over water alone. Instead, water has historically been a source of tension and a factor in conflicts that start for other reasons. However, water conflicts arise for several reasons, including territorial disputes, a fight for resources, and strategic advantage [23].

These conflicts occur over both freshwater and saltwater, and between international boundaries. However, conflicts occur mostly over freshwater; because freshwater resources are necessary, yet limited, they are the center of water disputes arising out of need for potable water [48]. As freshwater is a vital, yet unevenly distributed natural resource, its availability often impacts the living and economic conditions of a country or region. The lack of cost-effective water desalination techniques in areas like the Middle East [32], among other elements of water crises can put severe pressures on all water users, whether corporate, government, or individual, leading to tension, and possibly aggression [26]. Recent humanitarian catastrophes, such as the Rwandan Genocide or the war in Sudanese Darfur, have been linked back to water conflicts [48].

Water conflict occurs on our interdependent levels [16].

Local: Between societal groups competing for water in specific area, or between a state and its citizens in a specific area.

National: between different interest groups in relation to national policies affecting water management.

International: between states over the use of shared water resources.

Global: between marginalized and affluent populations, in which conflicts result when resources are distributed from marginalized populations on the periphery to move privileged sectors comprising the core.

"Water conflict in this study is limited about local conflict in agricultural sector related to use fresh surface water and described about agricultural condition of Iran".

4.1. Types of water conflict

There are many different types of water conflict [47]:

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 other's needs and opinions.

3. *Latent conflict:* This is 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.

We must ask ourselves what of the above conflicts is or are in the agricultural management of Iran and how we can solve it or them? This is a subject that we describe in the following of this article.

4.2. How water Stakeholders respond to conflict?

People respond to water conflict in different ways, depending on how important they feel it is to maintain a relationship with the opposing group and depending on the amount of power they think they have. This can be represented on a grid [Fig. 2]. There are five modes in this regard.

4.3. Good and bad points of each response

Table 4 describes five types of response to conflict that are mentioned above. There are the explanations of good and bad points of each response in [Table-4].

4.4. Cooperative water conflict management in theory

Water conflict situations in agriculture are come 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) [28]. Agricultural water conflicts have two dimensions: an object sphere (that is, the conflict issue with its legal, economic and social aspects) and a subject sphere (that is, the perception which people develop of each other as well as their communication and interaction based on these perceptions) [28].

Human beings have different and varying needs, both physical and psychological, and human behavior is related to actual interests and goals which, in turn, are also related to the perceived environment [15, 19, 43].

The implication for water conflict management and resolution is that it is not enough to find a one-and-for-ever optimal solution on the conflict issue, as often suggested in neoclassical economic approaches. It is equally important to develop an adequate solution to the *subject* sphere, which corresponds to the complex and dynamic situation of human beings in their environment [28]. Therefore, for fulfillment the optimum environmental protection and solving water conflicts in the best way, we must focus to another factor surplus economic factor such as social and psychological components that unfortunately are neglected from governmental agents. Really confirmation of technology, control of population growth and organization of them for confronting to water conflicts and protection of environment is impossible without focusing on social and psychological concepts of stakeholders.

4.5. Social and psychological concepts in water conflict management

Research in social and organizational psychology as well as in game theory shows that in most agricultural water conflict situations cooperative behavior leads to satisfying results for all persons involved. Cooperative water conflict management is determined by five important factors [28]:

1. Cooperative behavior at the individual level is an attitude that can be characterized by personal openness, the willingness to exchange information, the search for common interests ('linking' rather than 'separating') and response to external demands.

2. People must have common objectives; that is, different persons must be able and willing to identify one or more objectives which everybody wants to reach. Usually, these objectives are located at a rather abstract level and the root issue of the conflict is not directly mentioned. Through common objectives at a given level a joint point of reference can be created.

3. The focus on interests rather than on positions is important for several reasons. It means that at a general level interests of all participants are seen as relevant and serious. People who feel that they are being taken seriously can more easily accept diverging interests and look for similarities. Positions, on the other hand, are not perceived as negotiable. To hold on to positions means blocking the cooperative process.

4. Procedural justice means that the decision-making procedures are clear to everyone and are accepted by everybody. In other words, the question of how the controlling or influencing power among participants in a decision-making process is distributed has been solved satisfactorily. Transparency of interaction and of the decision-making process can be achieved either through the use of already established and recognized standards and structures, or through procedures and criteria that have been jointly developed.

5. Major preconditions for the structure of a cooperative water conflict management process are the autonomy of the actors, their voluntary participation,

development and coordination of labor division, and the delegation of tasks to single actors or subgroups.

5. Human Ecology and Water conflict

5.1. POET model: The roles of population, organization, environment and technology

Park and Burgess, in an early discussion of human ecology, stated that competition and conflict are sources of bringing about equilibrium in human systems. In this sense, competition and conflict can be thought of as "functional" for the human ecological system. Nevertheless, we endeavor to find ways of preventing intolerable levels and types of conflict. Many scholars speculate on the relationships between human ecological variables and social conflict [20]. A model to analysis water conflict is POET model that have four components including population, organization, environment and technology. In the below these components were described.

5.1.1. Population dynamics

Population growth influences social organization, the environment, and technology and in various ways may cause conflict over natural resources. Some have found that simple population growth is associated with higher levels of social conflict, net of other factors [20].

Rapid population growth in societies not equipped to deal with it is likely to lead to aggravated inequities, increased competition, and fighting over the resources that are within reach [18].

Pimentel et al. (1997), Pimentel and Giampietro (1994), and Bongaarts (1996) point out that population growth and density lead to scarcity of land and food. Food scarcity can contribute to political unrest and inequality as well as further degrade the environment by exacerbating deforestation, soil salinization, water pollution, and biodiversity loss [37, 38, 5].

Population growth and environmental degradation and depletion also contribute to the displacement or migration of peoples who have been called "environmental refugees". Displacement and migration contribute to ethnic competition and conflict when ethnically distinct groups try to exploit the same ecological niche [8, 36, 53].

Increases in population size, population density, and migration are all factors which are predicted to influence the likelihood of water conflict in the future. While many of the great sources of fresh water are already overextended, current population growth in certain regions of the world, particularly arid regions, will markedly reduce per capita water availability in the near future [20]. In the Middle East, it is predicted that, due to population growth, water will be critically scarce, even if agricultural uses are dramatically reduced. Within 25 years over 1.3 billion people in Africa and the Middle East will live in countries that do not have enough internal water resources to supply each person with a healthy supply of potable water [20].

Migration caused by water scarcity is another important demographic factor which can contribute to water

conflict. Ethnic competition is occurring in a number of regions where people have been forced to move in search of more reliable water sources.

Studies indicate that the present system is entering a new stage, with widespread economic and environmental consequences arising from its progression over the past 70 years. In the last century (since 1900) the population of Iran has increased about six fold. The population growth rate, which was less than 0.6 percent in the beginning of this period, reached the rate of 3.19 percent in the decade from 1976-1986. Fortunately, it has considerably decreased once again in the two last decades. The major changes in population growth rate, resulting from reduction of mortality and increase of natural growth rate, occurred in the 1960s and afterward. Between 1960 and 1996, about 37 million people (about 60 percent of the existing population) were added to the country's population. The direct impact of population growth on the water resources management of the country was an increased need for potable water in population centers. Indirect impacts were increased demand for agricultural products, development of irrigated lands, and the need for job opportunities and more income and finally water conflicts, especially in the agricultural sector [2]. Along with changes that have been described environmental demolition has been increased that many of these problems have a direct relation with water conflicts in agricultural sector.

5.1.2. Social organization

We cannot limit discussion of the effects of population on the environment to matters of population size, density, rate of increase, or migration, but rather, we must consider issues such as access to resources, livelihoods, and other social structural issues like gender and power [20].

Some have argued that the transition from traditional to modern economies is a process filled with conflict. Furthermore, many see the current political world economy as a source of conflict within and between countries. Shiva (1991) discusses how the development of India, from colonization to independence, has caused conflict. For example, the radical changes from traditional commons systems to industrial and market capitalism caused numerous conflicts, as traditional modes of sustenance and resource allocation were outlawed or outmoded [38,42].

The current order of social organization may in some ways contribute to conflict over water between people and nations. Industrial-capitalist norms which support large scale endeavors such as massive dams, diversion and navigation projects, and land reclamation may harm the balance of ecosystems, making it difficult for subsistence farmers and peasants to make a living [20]. Nowadays, In Iran, water resources management organization (that works infra Ministry of Energy) has responsibility of organizing and managing of water resources. Therefore government is owner and controller of water. However, government has no efficient management for organizing of water users in agricultural

sector. For more explanation it is necessary to describe the evolutionary trend of water management in Iran. This is done in the following of article.

5.1.3. The environment

Population growth and changes in social organization and technology have interacted to cause the degradation of the world's major water systems due to deforestation, mining, agricultural runoff, damming, sewage discharge, chemical discharge and oil spills, soil erosion, and channeling for navigation. The degradation of watersheds can lead to conflict as societies and nations attempt to address environmental and economic impacts of degradation [20].

Increasing rate of environmental damage is the consequence of increasing of agricultural water conflict, in Iran. For example, in an interview with farmers who inhabitant in downstream of Droudzan dam in Fars province (which is located in south west of Iran), is cleared that environmental damages have increased in recent years. Most of those environmental damages have related with water conflict in that area. Actually, water exploitation system as a governmental organization allocates a little of saved water at the back of Droudzan dam to agriculture and this action intensifies trend of environmental demolitions. Witnesses show the allocated water to agricultural sector is only for some little days in during one year and it isn't enough for suitable farming. Furthermore there is impossible to farm twice in one agricultural year. According to farmers' statements the time of delivering water is not appropriate and almost is not in the pick of plants' water needed. Droughts in recent years increase this process. The main contrast here is indeed the allocation of water to urban water use in comparison agricultural sector. According to farmers declarations, continuing this trend in recent years causes to decrease or rare some animal species. In the end of downstream of Droudzan dam, there is Bakhtegan Lake that Kor River is the main water resource of it. Droudzan dam there is in the way of Kor. Today, Bakhtegan lake is coming to dry and the place which was the station of accommodation of seasonal migratory birds, is already empty now. This trend continues and with the decline of agriculture, farmers had to for supply part of their living increase pressure on the environment. In reply to water scarcity, cultivation many of agricultural plants is not possible and farmers can't consider to alternate agricultural plants and products in the correct way and this action causes to soil quality degradation.

5.1.4. Technology

An increase in population creates environmental problems to be solved, but it also means more minds to ponder solutions to a problem. So population growth sometimes necessitates new technologies, but new technologies allow even more population growth. Increases in population, population density, and technology cause environmental and organization changes, as people consume more of their natural

resources and need new social institutions to address new concerns [20].

Some theorists in the ecological modernization school speculate that an environmental Kuznet's curve - that is the reduction of negative environmental impacts in later stages of development - is the result of increasing technology (Crenshaw and Jenkins, 1996; Ehrhardt-Martinez et al., 2002; Sonnenfeld, 2002). The argument is that while environmental damage was severe in the earlier stages of industrialization, technological developments, combined with changes in social organization associated with post-industrial society, have improved environmental efficiency and stabilized, or even reversed, the amount of harm caused to the natural world. There is some debate over the extent to which this is occurring and, historically, developments in technology have both alleviated and created conflicts over natural resources [40, 45].

Technology has interacted with population growth to bring about major social organizational and environmental changes, all of which affect competition for natural resources. Technology has an interesting association with water conflict in that it may both cause and reduce disputes [20].

Large scale hydroelectricity and irrigation projects have been the sources of many water disputes, while newer technologies like water desalination and drip irrigation technology may alleviate water demand issues that lead to conflict [20].

In several industrialized and developing countries such as Iran, participatory and cooperative conflict management strategies are actively pursued. Empirical evidence shows that participatory and cooperative approaches lead to better results than classical methods of conflict resolution, at least in terms of sustainability and social acceptance [20].

One of the most important factors that have caused water conflicts in agricultural sector of Iran is careless to indigenous and local technologies such as subterranean canals (Ghanat) and in the other side careless to compatibility of modern technologies in irrigation and water management.

6. The evolutional trend of water conflict in agricultural sector of Iran

In reply to why water conflict is a crisis in agricultural sector in Iran, we must focus on the evolutional trend of water conflicts in the using of water resources in agriculture. There are three turning points in this trend [Fig. 3].

6.1. 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. Landlords that sometimes named masters were persons who had a lot of lands and water resources as two key components of agricultural production. Consumption and distribution of water was

controlled by them under a specific discipline. Therefore, there was a latent water conflict in that period.

6.2. 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 recorded as national resource. Government was known as responsible of control and managing of water in agricultural sector. Government was assigned to administrate distribution of water among stakeholders. In that way, some rules were registered for better control of water distribution. Forcefully, are admitted the start of agricultural water conflicts is from this point, because the government had no control and surrounding on water resources such as landlords. For example unauthorized revenue from water resources increased after land reform. Also digging of deep wells developed. We can say in this period not only the government had no enough power to control water conflict, but that was a factor of creation conflict between itself and stakeholders.

6.3. 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 needed anticipation and legal mechanism for controlling water conflicts. Furthermore, in 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 conflict there is between government and stakeholders especially in districts that are confronting with drought. On the other side, urban and industrial consuming has had a large growth in recent years and government allocates the most of saving water to them. It is one of the reason of conflict between government and stakeholders.

One of the most important affaires of government in Iran to encounter with water scarcity is building dams to control and save flowing waters. However that is a good affair and has a lot of benefits, but the government is disabling for solving water conflicts. The most important reason for these conflicts, according to Game theory is a serious reality. Actually, in the stakeholders' imagination government owns the water resources and they are just consumer. In this way they often are loser and government is winner. While there is this imagination, water conflict increase and increase in agricultural sector.

In addition to reduction of governmental control and expanding the range of drought in recent years, conflict among stakeholders increase that regarded to unauthorized uses of flowing and underground waters in agricultural sector. Nowadays, these conflicts are more "surface conflicts". In such areas they are "latent

conflicts". These conflicts referenced to stakeholders' imaginations about they are loser in comparison other stakeholders who are in other areas (according game theory). For example in downstream of Droudzan dam in Fars province of Iran, farmers who are in downstream think other farmers in upstream have more water than them. Undoubtedly, the government set a series laws in this regard, but this imagination is dominant thought in that area. Farmers who live in up streams also think the water that saved behind of dam more used for urban and industrial consumptions [Fig-3].

7. Conclusion

Iran is a droughty country in many parts and water resources for using in agricultural sector are very limited and it leads to conflict among stakeholders. This conflict is more between government (as owner and manager of water) and farmers (as users). On the other hand, the environment has been damaged by these conflicts. This article with describing some of conflict theories and a human ecological model, tried to explain agricultural water conditions in Iran.

Actually, conflict happens when two or more people or groups have, or think they have, incompatible goals. Agricultural water conflicts in Iran shows there is different goals among stakeholders especially between farmers and government.

One of the most important consequences of water conflicts are the environmental effects that are possible for research and study from variable viewpoints. In the view of NEP and according to POET model, water conflicts can effect on population, social organization, environment and technology and also is affected by them. In this way, the quite important matter is reach to optimum water conflict management for protecting and sustainability of environment among conflicting groups. It is expected the conflict can change to cooperation during short time. According to game theory assumptions, the best result is win win mood for conflicting groups. In Iran, which has priority before any other things, is recognition of those groups. In this time, the main users of fresh water that agricultural sector is affected by them are farmers, government (as an administrator of water management), some industrial factories, rural and urban users of fresh water.

In the case of Iran, what can help to remove or decrease agricultural water conflicts would gotten by shifting from governmentality to governance. This action needs some preconditions such as cultural supporting, people participation, adaptation of water technologies, and assistance of government without authority and instruction of water stakeholders. Cultural support for development in water resources management includes regenerating traditions and social institutions that have adapted over time to different geographical conditions, especially in arid and semiarid regions.

Some natural phenomena such as drought and especially climate changes and also the kind of irrigation technologies have excessive effects on water conflicts management. In another way, it is necessary to know

water conflict has a significant relationship with the kind of land system. In Iran, after land reform (1963) the role of government become bigger in this regard and one of the most challenges for decreasing local water conflicts in agricultural sector is providing stakeholders' participation in water management projects. Therefore, in this situation, the most important tries in exploitation of fresh water must lead to cooperation between government and farmers. We must keep in mind that, without people participation, reduction of water conflicts is impossible.

According to Table 2, with the focusing on historical trend of relationship between human and environment and natural resources, seems the only practical way for control water conflict in agricultural sector is attention to human and set him in the center of regarded affairs. Focusing on this crisis, must be on stakeholders' water in agriculture. We can't accept to manage water conflict just with serial inflexible laws. Therefore administration water cannot be continued under control of the government.

The main key in this regard is launching of stakeholders participation for water management. Actually, it is necessary to form the imagination that they are owner of water resources and they are responsible for preservation and optimum use of water. Creation and empowerment of collaboration sense in the format of cooperation groups such as "water user groups" is a suitable approach in this way. That is needed to governmental cooperation changes as a cohort and supervisor no as owner of water resources or controller and manager. Changing of this imagination that which stakeholders are owner of water instead of they are just users is a very important role that government must preferences. This important event isn't impossible if all stakeholders participate in water management.

Accordingly some applicable recommendations are presented in Table 5 that paying attention to them can control and decrease agricultural water conflict in Iran [Table 5].

In this background there are some challenges and questions that they can be epigraphs of future researches for comparison and controlling of water conflict in agricultural sector. Most important of them are:

- What are the needed things for accepting of water responsibility from stakeholders?

- What are the needed actions for cession of governmental roles to water stakeholders in agricultural sector?

- What are the ways to induce stakeholders' participation in the solving of water conflict crisis especially in drought condition?

- What are the legal shortcomings in the background of water conflict and how we can remove them?

- What are the needed actions for organizing and empowerment of water user groups in agricultural sector?

- What is the role of governmental interference in water management and how we can improve interaction

between farmers and government? In other words, how we can make imagination for stakeholders that they are in the mode of win, win with government?

- What are the role of agricultural extension and education in this regard?

- According to POET model what technologies for water management are the best for decrease water conflict and have minimum undesirable effects on environment?

- What is the best way (ways) for organizing farmers for water conflict management towards protection of environment?

There is a hope in the future with efficient water resources management and also management of water conflicts especially in agricultural sector, according to POET model, many of environmental problems can alleviated in Iran.

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Table 1 -Water availability and use in Iran [1, 3]

Component	Volume(bcm)	Percent of total
Precipitation	413	100
Evaporation	283	70
Renewable water	130	30
Surface water	105	
Ground water	25	
Total water use	87.5	100
Agriculture	82.0	94.25
Domestic	4.7	7.75
Industry(etc.)	0.8	1.00

Table 2-Five basic epistemologies in environmental sociology (Elaborated of research findings)

Epistemologies in environmental sociology		Explanations
1	<i>Neo-Malthusianism</i>	Works like Hardin's <i>The Tragedy of The Commons</i> (1968) reformulated Malthusian thought about abstract population to a model of selfishness as causing environmental degradation of the use of common property goods like the air, water, or general environmental conditions [12].
2	<i>Eco-Marxism</i>	Neo-Marxist ideas of conflict sociology were applied to capital/state/labor/ <i>environmental</i> conflicts instead of only labor/capital/state conflicts over production. Therefore, some sociologists wanted to stretch Marxist ideas of social conflict to analyze environmental social movements from this materialist framework instead of interpreting environmental movements as a more cultural "New Social Movement" separate than material concerns. So "Eco-Marxism" was based on using Marxist conflict sociology concepts applied to environmental conflict [10].
3	<i>Ecological Modernization (Reflexive Modernization)</i>	By the 1980s, a critique of Eco-Marxism was in the offing, given empirical data from countries (mostly in Western Europe like the Netherlands, Western Germany and somewhat the United Kingdom) that were attempting to wed environmental protection with economic growth instead of seeing them as separate. This was done through both state and capital restructuring. Major proponents of this school of research are Mol and Spaargaren. Popular examples of ecological modernization would be "cradle to cradle" production cycles, industrial ecology, biomimicry, permaculture, and agroecology--all implying that economic growth is possible if that growth is well organized with the environment in mind [10].
4	<i>Social Construction of the Environment</i>	Additionally in the 1980s, with the rise of postmodernism in the Western Academy and the appreciation of discourse as a form of power, some sociologists turned to analyzing environmental claims as a form of social construction more than a 'material' requirement. Proponents of this school are Hannigan, particularly in <i>Environmental Sociology: A Social Constructionist View</i> (1995). Hannigan argues for a 'soft constructionism' (environmental problems are materially real though they require social construction to be noticed) over a 'hard constructionism' (the claim that environmental problems are entirely social constructs) [10].
5	<i>New Ecological Paradigm (NEP)</i>	The Human Ecological Paradigm (HEP) viewpoint claims that human-environmental relationships were unimportant sociologically because humans are 'exempt' from environmental forces via cultural change. This view was shaped by the leading Western worldview of the time and the desire for Sociology to establish itself as an independent discipline against the then popular racist-biological environmental determinism where environment was all. In this NEP view, human dominance was felt to be justified by the uniqueness of culture, argued to be more adaptable than biological traits. Furthermore, culture also has the capacity to accumulate and innovate, making it capable of solving all natural problems. Therefore, as humans were not conceived of as governed by natural conditions, they were felt to have complete control of their own destiny. Any potential limitation posed by the natural world was felt to be surpassed using human ingenuity. Research proceeded accordingly without environmental analysis [12]. The NEP recognizes the innovative capacity of humans, but says that humans are still ecologically interdependent as with other species. [21]. NEP while humans have exceptional characteristics (culture, technology, etc), they remain one among many species that are interpedently involved in the global ecosystem. NEP Human affaires are influenced not only by social and cultural factors, but also by intricate linkages of cause, effect, and feedback in the web of nature; thus purposive human actions have many unintended consequences. NEP Humans live in and are dependent upon a finite biophysical environment which imposes potent physical and biological restrains on human affairs. NEP Although the invectiveness of humans and the powers derived there from may seem for a while to extend carrying capacity limits, ecological laws cannot be repealed [22].

Table 3- Models of Conflict Theory (Elaborated of research findings)

Conflict Theory		Explanations
1	<i>Marxism</i>	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. Capitalism structures an irresolvable conflict between the two fundamental classes, the working class and the capitalist class [46].
2	<i>Parsonian Conflict Theory (Dahrendorf)</i>	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, and commands, warning and prohibitions, the behavior of the subordinate element” [46]. 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 ”. Indeed, in contrast to both Marx and Weber, Dahrendorf endeavors “to detach the category of conflict groups...from economic determinants”. Finally, since authority relations are necessarily present in all societies, conflict is inevitable [46].
3	<i>Elite Conflict Theory (C. Wright Mills)</i>	C. Wright Mills has been called the founder of modern conflict theory. 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." [27]. 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.

Table 4-Good and bad points of each response to water conflict [47]

Type of response	Explanations
1 Indifference	If Stakeholders feel that both their goals and relationships are not important, they might simply stay out of the conflict. They might feel the conflict is none of their business. On the other hand, they might feel their involvement will make no difference.
2 Giving in	Stakeholders give in if they place great importance on their relationships with others and little upon their goals. They want peace at all costs. To be accepted and liked by other people is most important. Conflicts may disappear just because someone stays friendly. But giving in may also mean keeping silent about the real issues and hurts.
3 Forcing	Stakeholders who overpower their opponents have a low regard for others. They do not place much value on relationships with others. Winning is part of the goal. Some people use force because they are used to being on top or because they do not want to admit that they might be wrong. What they do not see is that by winning, they are forcing others to lose and that they might only stop the conflict for a short time.
4 Compromising	Stakeholders compromise if they know they will not achieve all their goals. They negotiate, bargain and promote relationships without it costing either side too much. They see the need for both sides to gain something. But sometimes the result is that everyone feels the outcome is unsatisfactory or that neither side is committed to the solution.
5 Cooperating	For these Stakeholders, relationships and goals are important. They believe that Stakeholders can find new and imaginative solutions to water conflict that lead to both sides winning. When conflicting groups sit down together to discuss their goals, they often realize that their goals have changed. Perhaps they did not look at the long term. Or perhaps they came to see that everyone gained more by working as partners, not opponents.

Table 5- Recommendations according to POET model (Elaborated of research findings)

POET model	Recommendations
Population Dynamics	<ul style="list-style-type: none"> - Strengthening and changing the imagination that stakeholders are owners of water resources instead they are just users. Achieving to this purpose is possible only with applied education and inducing of stakeholders' participation. - Presentation applied educations towards reduce population growth. - Presentation appropriate educations towards correct uses of water and spread the culture of economize in use of water resources. - Teaching and improving interaction and cooperation instead of conflict among stakeholders.
Social Organization	<ul style="list-style-type: none"> - Focusing on devolution of authority from government to stakeholders toward water resources management. Actually the role of government must change from administrating to monitoring and cooperating. - Establishing and organizing water user groups and co-operations among farmers and monitoring their functions are in the productive and efficient way. - Making clear the governmental actions in the managing of water resources for stakeholders with inducing their participation. - Organizing stakeholders towards changing water conflict to water cooperating.
The Environment	<ul style="list-style-type: none"> - Emphasize on the role of agricultural extension and education in the efficient using of water resources and decrease of water conflict especially toward its environmental effects. - Enhancing protective values of water and environmental resources instead of irregular uses of them that create conflicts.
Technology	<ul style="list-style-type: none"> - More attention to indigenous knowledge and culture in water resources management linked to using of new technologies. - Revival local and indigenous technologies in water management among stakeholders. - Developing compatible technologies for protecting and sustainability of environment.

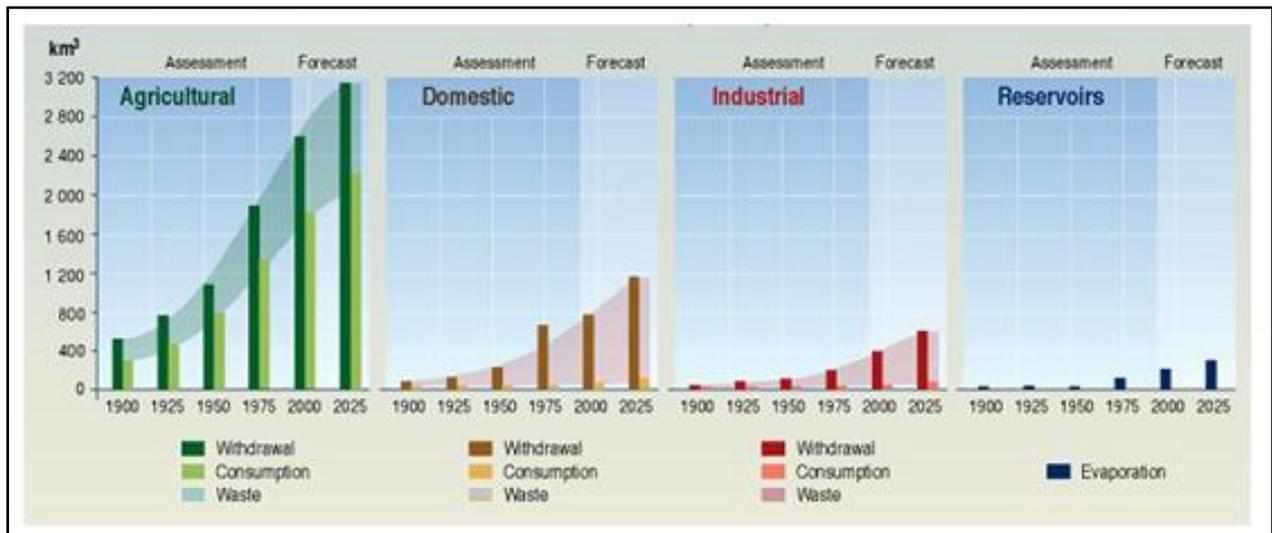


Fig. 1- Evolution of global water use by sector; Source: [51, 24]



Fig. 2- Prioritizing relationships and goals, Source: [47]

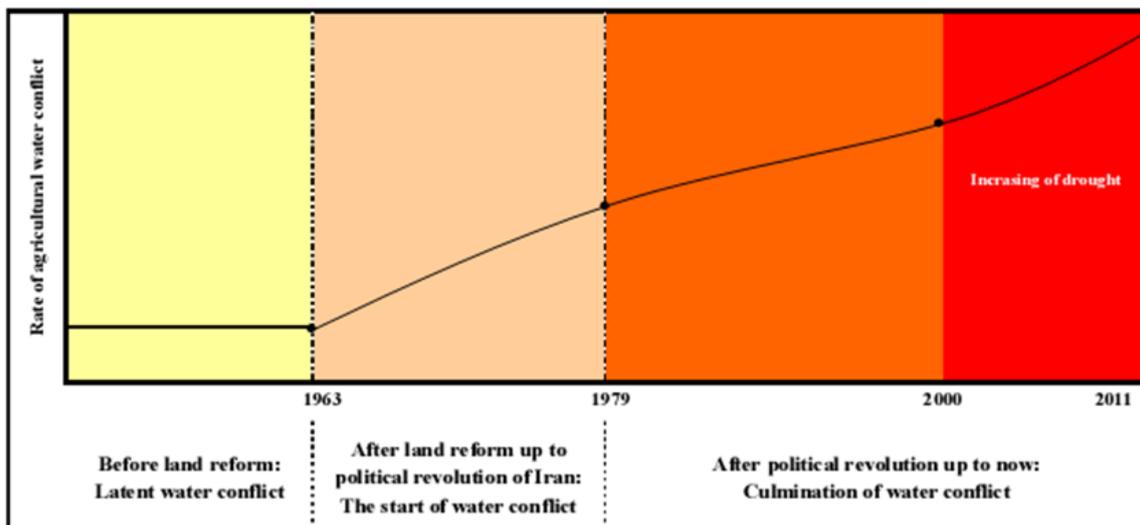


Fig. 3- The evolutionary trend of water conflict in agricultural sector in Iran
Source: [Elaborated of research findings]