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Paradigmatic Analysis of Environmental Management in Iran

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Abstract

Iran has many critical environmental changes and challenges, especially in agricultural development. These challenges are due to land reform and subsequent modernization. The main purpose of this paper is to analyze the paradigmatic trend of agricultural environmental management of Iran. The study was accomplished through reviewing archival research findings as well as analyzing the content in different documents and worldwide databases. To do so, various global paradigmatic perspectives and strategies about the environmental management were reviewed. Moreover, by reviewing different environmental laws, rules, regulations, and activities in Iran, three distinct phases in environmental management including 'enthusiasm for modernization activities (1962- 1974)', 'concerns about environmental issues (1974- 2005)', and 'crisis of environmental management (2005-present)' were revealed. Thus, the most important problems leading to the unsustainable environment in the three phases and the reasons resulting in the failures of macro-policies were addressed. It is possible to declare that inappropriate paradigms within environmental management thinking, i.e., sustainability, as well as inconsistencies between the paradigms and strategies could be traced in different periods. The findings provide the researchers with the fact that the dominant perspective in environmental management is frontier economics via emphasis on economics and fewer considerations over ecological problems. Accordingly, the environmental degradation increased, via which the authorities were not successful to conduct collaborative systematic actions since the evidence represented the mere accomplishment of some sporadic strategies. As the pedagogical implications of the study, it should be asserted that a basic paradigm shift in environmental activities from technocentrism to ecocentrism seems to be necessary to achieve sustainable agriculture.

Keywords:
Agriculture; Biocenterism; Ecocenterism; Ecological Footprint; Sustainability; Technocenterism

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INTRODUCTION

Sustainable development and environmental management are the most commonly cited ideas linking the environment and development concepts together. Sustainable development emerged in the 1980s out of the marriage between developmentalism and environmentalism (Sachs, 2000). The concept contains ecocentric, biocentric, and technocentric responses to the threats of development to the environment and people (Adams, 2009; Kortenkamp & Moore, 2001). By the time, many governments adopted a techno-centric thought that considered environmental problems to be considered as the unfortunate side-effects of economic growth and development. On the other hand, sustainability embraces both environmental and human systems, through which the understanding of humans' dimensions in sustainability must encompasses the "driving forces" of anthropogenic environmental change, i.e., population change, economic growth, technological change, political and economic institutions, as well as attitudes and beliefs (Stern & Dietz, 1994). Sustainability, thus goes beyond ecological efficiency to include social sufficiency which should be addressed in the management scopes. The need to 'manage' the environment aroused when traditional understandings began to prove inadequacies to control the subjective coordination and social developments. The worldwide environmental management founded in Stockholm, Sweden, in 1972 during the implementation of the United Nation's conference on 'Human Environment', by which the participant countries started passing laws to protect the environment in their regions.

Environmental management is defined as the optimal distribution of population and activities to create a balance between economic and social practices, considering capacities, needs, and situations, and to provide a balance between the population and economic capacities/capabilities (Higa Eda & Chen, 2010). The most important purpose of environmental management is to incorporate human needs into the environmental and natural resources systems in a sustainable manner. Environmental management with an emphasis on agriculture is defined as a balance between natural resources' capacities called 'biocapacity' and the volume and amount of agricultural activities (Borucke et al., 2013). Given the limited capacity of natural resources, utilization of resources should be rational and reasonable in order to prevent or reduce degradation of the resources. In this view, providing a sustainable system of natural resources productivity is an ultimate goal of all environmental management in agriculture. It is noteworthy to consider paradigmatic perspective as one of the most crucial components in this area. The sustainability of environmental management depends upon our paradigm in the relationship between society, environment, and the stakeholders` perspective towards the resources since the environmental behavior of each individual depends on how he/she thinks about natural resources (Raum & Potter, 2015). In addition to determine the paradigmatic perspective, it is necessary to define a list of action plans as the executable strategies in the next phase (Kapoor, 2001). Indeed, any managerial system needs a complex set of strategies in order to achieve required strategic plans.

Through emphasizing the role of agriculture in the environmental management, it is important to define the dominant scenarios on the organization or the society of the concept regarding agricultural productions. Shibusawa (2002) proposed three scenarios in the agricultural technology development. The first scenario promotes conventional farming technology through intensive mechanizations to reduce the labor input based on a "high-input and high-output" conventional strategy. The second scenario has a strategy for a "low-input but constant-output." He argued that the third scenario is based on "optimized input-output." Application of modern agricultural technologies and their effects on agricultural production are the main factors in each strategy over time due to the traditional farming transition from

conventional agriculture to the eco-friendly style of farming, e.g., organic farming. It is also crucial to consider that elimination or reduction of natural resource degradation is the main purpose of every environmental management system (Gao & Tian, 2016). Thus, it is the essential factor that will be considered in order to evaluate the environmental management system. An effective environmental management framework should be based on resource accounting; i.e., planning for natural resources consumption by precise assessment of the capacity or thresholds of different natural inputs in the specific area and allocation for human use in order not to place pressure on nature (Borucke et al., 2013). Resource accounting attempts to create a balance between human demand and nature supply. The public perception about the importance of environmental protection concerns the precondition for the environmental management (Ragkos et al., 2015; Malgand et al., 2014). Appropriate management of agricultural demand can lead to the assurance of optimal water and land use. Paradigmatic analysis of environmental management trend in Iran is the main purpose of this paper. Therefore, the following sub-topics were considered as the objectives:

- Reviewing and introducing environmental management, associated paradigms, and strategies;
- Categorizing and describing the trend of environmental management in Iran focusing on its components by reviewing environmental rules and regulations;
- Providing four special cases of different crises and mismanagement of environment in the country.

Environmental Management in a Paradigmatic Perspective

Environmentalists' thinking has been divided into technocentrism, biocentrism, and ecocentrism (Adams, 2009; Bourdeau, 2004). The intellectual foundation of every society is the reflection of its policy makers' and key decision makers` paradigm, based on which the various paradigms of the relationship between human and nature of environmental management has been provided. On the other hand, strategies come to the field to consider the list of action plans.

Technocentrism

Technocentrism thinking is based on a managerial thought to the environmental management where the satisfaction of man is the center of all activities. The paradigm of frontier economics views nature as an infinite supply of physical resources for human benefit and the environment and society are split apart and humans have a duty to fight and conquer environment as well as use it as a resource or degrade it without fearing the after-effects (Kapoor, 2001). Nature as a resource means that the primary purpose is to service unfettered economic growth (Redclift, 2006). Concerning the human exemptionalism paradigm, Dunlap and Catton expressed that humans were seen as being "exempt" from ecological constraints due to our exceptional characteristics relative to other species (Dunlap et al., 2002). Anthropocentrics argued that the environment should be protected because it maintains or improves the life for humans (Cornell, 2011). The egoistic and social-altruistic values expressed by Stern et al. (1993) are similar to the anthropocentric worldview. The major Western schools for the development of modern Western science view nature as existing for man's instrumental benefit (Pepper, 1996). Therefore, technocentrism is an unecological placing man at the center of a world that nature is an adversary of society.

Biocentrism

Biocentrism values nature for its own sake and judges it in a way to deserve protection because of its intrinsic value. This thinking sees nature as worth preserving regardless of the economic benefits (Pentreath, 2004). Nowadays, many worldviews and paradigms are in line with the idea. The "limits to growth" proponents argue that there are ecological limits to the scale and kinds of economic activities in which humans can engage. This paradigm views humans as one

of many species in nature, accepting the world's physical and biological limits. The paradigm also views nature as a victim of human action (Cornell, 2011). Deep ecology, as the other paradigm concerned in the field, tries to synthesize many philosophical attitudes on the relationship between nature and humans, with a particular emphasis on ethical, social, and spiritual aspects downplaying the dominant economic worldview (Ehrich, 2002; Paterson, 2006). This paradigm, as the opposite of frontier economics, is viewed as a "biocentric" (non-anthropocentric) view of the relationship between man and nature.

Ecocentrism

Ecocentrism considers the fact that social relations complement man-environment interaction (Adams, 2009). Regarding the negative impacts due to application of frontier economics, many emphasized the thinking of ecology versus economic growth. Ecodevelopment as the most famous paradigm in ecocentrism also emphasizes the ecological foundations and constraints of development (Colby, 1991). The core of the eco-development paradigm is to restructure the relationship between society and nature into a "positive sum game" by reorganizing human activities so as to be synergetic with ecosystem processes and services (Colby, 1991). In the age of environment, environmental protection is a positive-sum game which is seen as a matter of efficiency in the use of resources. It involves a shift from a zero-sum game (the environment benefits at the expense of the economy and vice versa) to a positive-sum game (Rezaei-Moghaddam & Fatemi, 2013). This requires a longer term management of adaptability, resilience, and uncertainty, to reduce the occurrence of surprises caused by crossing over unknown ecological thresholds (Colby, 1991). This paradigm moves on from economizing ecology to ecologizing the economy, or whole social systems. From the conflict between anthropocentric versus biocentric values, it attempts to synthesize ecocentrism: refusing to place humanity either above nature or below it.

Following the discussion on different paradigms in environmental management debate, it is required to mention diverse managerial strategies of the environment. The relationship between the organization and the external environment is emphasized to identify the strategies. This challenges the position that organizations are or need to be passive-reactive entities with respect to the external environment. In contrast, governments and organizations can and do implement a variety of strategies designed to modify existing environmental conditions. This means that they can become proactive agents of change by attempting to manage their external environments. The studies discussed strategies under a concept of environmental management into three categories: independent strategies, cooperative strategies, and strategic maneuvering (Zeithmal & Zeithmal, 1984; Fatemi et al., 2018).

Historical Trend in the Environmental Management in Iran's Agriculture

Throughout history, Iran has been home to magnificent civilizations due to an abundance of its natural resources. Utilization of these natural resources was combined with the concept of environmental conservation that is rooted in the rich culture of Iranians. The beginning of environmental law is attributed to the United Nations conference in Stockholm in 1972. Environmental law is an important tool of nation or organization for the monitoring and management of natural resources and sustainable development. The laws are effective in policy making, environmental protection measures, and establishing wise and sustainable use of natural resources (Kiss et al., 1998). It cannot be expected that all environmental problems will be solved by applying and enforcing environmental laws. Other important factors, such as public awareness and enlightenment, as well as institutionalization of this issue into the culture and social behaviors will be required. Three distinct phases of environmental management in Iran can be noted by reviewing the environmental rules and regulations over time (Table 1, Figure 1). As discussed earlier, the paradigmatic

Table1
The Most Important Environmental Rules and Regulations in Iran

Phase	Rules	Level
Enthusiasm for modernization activities	Hunting and fishing rule- 1967	National
	The rule of conservation and utilization of forests and pastures - 1967	National
	Plant protection rule- 1967	National
	The rule of reconstruction and tasks assignment of the ministry of Agriculture and the Organization of Natural Resources- 1971	National
Concerns about environmental issues	Conservation and reform of the environment law- 1974	National
	Prevention of air pollution law and regulation - 1975	National
	Conservation and reform of the environment bylaw - 1975	National
	The 50th principle of Iran Constitution - 1979	National
	Equitable distribution of water law - 1982	National
	Prevention of water pollution regulation - 1984	National
	13th clause of the first program of economic, social and cultural development law-1989	National
	Transmission of environmental polluting industries of Tehran - 1990	Regional
	The law of forests and natural resource conservation - 1992	National
	81st to 83rd clauses of the third program of economic, social and cultural development law- 1994	National
	Land use conservation law (farm lands and gardens)- 1995	National
	The law of aquatics conservation and utilization - 1995	National
	Prevention of air pollution law and regulation- 1995	National
	Environmental Impact Assessment (EIA) regulation- 1997	National
	The bylaw of 82nd clause of the second program of economic, social and cultural development law- 1998	National
	104th and 105th clauses of the third program of economic, social and cultural development law- 2000	National
	The regulation of conservative council formation of Karoon basin- 2002	Regional
	Waste management law- 2004	National
Crisis of Environmental management	58th to 79th clauses of the fourth program of economic, social and cultural development law- 2005	National
	The regulation of deal with harmful effects of dust - 2009	National/International
	Clean air standards- 2009	National
	Waste management bylaw- 2009	National
	Climate change convention bylaw and Kyoto protocol – 2009	National/International
	The regulation of clean development projects due to Kyoto protocol – 2009	National/International
	The rules of operational management of agricultural wastes - 2010	National
	The regulation of entry, construction and consumption of chemical, biological and organic fertilizers and pesticides -2010	National
	The environmental rules of waste disposal sites - 2010	National
	The instruction of how to use sewage sludge as a fertilizer on farms – 2010	National
	The law of the establishment of industrial and production units - 2011	National
	The rules and regulations of the establishment of industrial and production units- 2011	National
	The regulation of environmental impact assessment of big production project plans- 2011	National
	190th clause of the fifth program of economic, social and cultural development law about Green Management- 2012	National

perspectives and related strategies of environmental management, different scenarios of agricultural technology development, environmental awareness, resource accounting as well as reduction of natural resources toward sustainability are different components of agricultural environmental management. The historical trend of environmental management of Iran in the triple phases have been studied focusing on these components.

First Phase- Enthusiasm for Modernization Activities (1962- 1974)

The beginning of modernization in agriculture in Iran is attributed to the land reform of 1962 (Rezaei-Moghaddam et al., 2005). The population was 19 million in the beginning of the first phase and the population growth rate was 3.13 percent (Population & Housing Census, 2011). The main objectives in agriculture were cultivation maximizing and yield growth. The prevailing belief of dominant paradigm and intellectual infrastructure in this era was that natural resources were unlimited. The idea of environment as an adversary of society is seen in these activities. The heart of this worldview is its emphasis on anthropocentrism or frontier economics paradigm. Diffusion of modern technology from developed countries were introduced to Iranian agriculture and formed the basis of the agriculture system as well as different types of modern production systems, including capitalist farm enterprises, farm corporations, rural modern cooperatives, and agribusinesses (Lahsaeizadeh, 1993). This period of agricultural development coincides with the so-called "green revolution" (Rezaei-Moghaddam & Karami, 2008b). The degradation level was low and intangible due to the omission of natural resources degradation consequences (Table 2). Rezaei-Moghaddam et al. mentioned to the unsustainable situation in agriculture in this phase (2005). According to the name of this phase (i.e., enthusiasm for modernization activities), the transition from the traditional world to the modern world was the only way to achieve agricultural development. Thus, priority was given to the application of technology and increased production while concerns for environmental issues were neglected.

Second Phase- Concerns about Environmental Issues (1974- 2005)

More than one decade after beginning modernization in different fields in Iran, the attention of policymakers was drawn towards environmental issues attributed to some problems of modernization activities. In 1974, following the 1972 conference on sustainable development in Stockholm, Sweden, conservation and reform of the environment law was passed in Iran. In 1975, the operational bylaw of conservation and reform of the environment was passed, i.e., it includes comprehensive definitions and regulations for environmental conservation for all regions monitored by the organization of environmental conservation of Iran. The prevention of air pollution law and regulation was also passed in the same year. This law covered three different sources of air pollution such as motor vehicles, industries as well as commercial and residential factors. In 1979, the 50th principle of the Iran Constitution was the messenger of the necessity of environmental conservation to ensure that the present and future generations might have social, healthy, and progressive lives. According to this principle, any social and economic activity causing environmental pollution and degradation was forbidden (Shaeri & Rahmati, 2012). The 50th principle of the Constitution is one of the most credible and significant laws of the nation in terms of environmental conservation. The first program of economic, social, and cultural development law of Iran, affecting pollution prevention and control, was passed in 1989. To facilitate implementation of this law, it included incentives and tax breaks for industries that participate in pollution reduction (Tahmourian, 2007). Indeed, some independent sporadic strategies were the basic strategies of environmental management in this phase.

The population was 33.7 million in the beginning of the second phase and the population growth rate was increased to 3.91

percent in this phase (Population & Housing Census, 2011). The emphasis in this phase was the production when a commodity-led primary industry emerged. Resource accounting as an important component of environmental management was still neglected as in the first phase. According to recent estimates of the World Bank in 2005, the annual costs of air pollution and urban air pollution mortality equaled 1.6 and 0.57 % of GDP, respectively, after 20 years of the prevention of air pollution law and regulation in 1995. The symptoms caused by urban air pollution are very worrisome as well. On other hand, the costs of education in this time period and urban air pollution costs to recreation centers were 0.02 and 0.04 % of GDP, respectively (World Bank, 2005). Based on these quantities, reducing the natural resource degradation could be seen as an important component toward a sustainable environmental management.

Third Phase- Crisis of Environmental Management (2005-Present)

There is a great emphasis on environment conservation, land use planning and regional balance in the second part of the fourth program of economic, social and cultural development law that was released in 2005. Instructions for calculation of cost-benefit of priorities like water, soil, forest, energy, biodiversity and environmental pollution are the main part of this law in support of environment conservation. The promotion of compost utilization and biologic management, as well as waste management programs with environmental technical methods by cooperation of different organizations such as provincial, municipal and lower governmental entities, are some of the goals in this path (Zahedi, 2012). The rules and regulations of the establishment of industrial and production units in 2011 was one of the most important steps in this phase. According to this law, the country was divided into 10 different parts and thus the industrial and production units were categorized into 14 different kinds based on their production process. The prevention, elimination and reduction of negative effects of human activities on the environment was the main emphasis of these rules and regulations (Shaeri & Rahmati, 2012). The regulation of environmental impact assessment of big production project plans was passed by the Iran government in the same year.

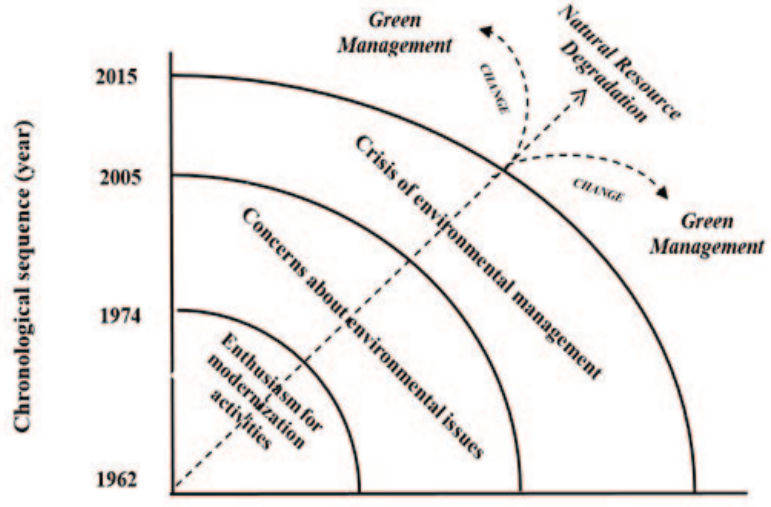

Figure 1. Chronological Trend of Environmental Management and the Phases Features in Iran

Table 2
The Features of Triple Phases of Environmental Management in Iran

Component	First Phase (1962-1974)	Second Phase (1974-2005)	Third Phase (2005-present)
Paradigmatic perspective	Frontier economics	Frontier economics	Need to change
Environmental management strategies	No specific strategy	Independent	Independent
Agricultural technology development scenario	High Input-High Output	High Input-High Output	Low Input-Constant Output
Environmental awareness/Environmental concerns	Very Low	Low	High
Natural resource degradation	Low	High	Higher/ Environmental Crisis
Resource accounting	Neglected	Neglected	Neglected in implementation, Emphasizing by rules
Sustainability	Unsustainable	Unsustainable	Unsustainability Intensification

The dominant paradigmatic perspective of the agricultural activities is still based on frontier economics in the third phase. There is growing concern on independent strategy of productivity, when resource use efficiency became an issue. Environmental awareness and concerns increased greatly among agricultural experts and agents, farmers and other stakeholders. This is an important factor in moving toward sustainable development route in Iran (Rezaei-Moghaddam & Fatemi, 2013). Due to irrational use of natural resources in recent decades, the large amount of degradation and unpleasant consequences were obvious visually. In 2010, the production of wheat as the main crop of Iran was 13,500,000 tons; this reflected an increased rate of 5,100,000 tons more than in the previous year (Table 3) (FAO, 2011; FAO, 2014). There are some relevant data about the trend of degradation on natural resources including water, soil, and air as the proof of environmental management failures in Iran (Table 3). Resource accounting is still ignored as an important component of environmental management resulting in natural resource degradation at greater level.

Weak participation among different agricultural stakeholders has been leading to ineffectiveness of the agricultural activities in many parts of Iran (Nematpour & Rezaei-Moghaddam, 2014). Based on Bijani et al. (2013) poor participation of the stakeholders in the programs is one of the principal reasons of agricultural extension programs` failure in Iran. Development of human resources and participation are needed for better environmental management, protection, and development (Rezaei-Moghaddam & Karami, 2008a). Consumption of fertilizers as a dominant strategy in arable lands and permanent crops was 41.4, 18.1, and 3.6 kg per hectare for N, P, and K, respectively, in 2009 (FAO, 2013) and the consumption of pesticides was 0.45 kg per hectare in 2011. Iran had less than half of one percent (0.04 million hectares) of its agricultural area dedicated to organic agriculture as a strategic maneuvering in this year (FAO, 2014). In 2007, Iran was ranked 123rd among all countries by the World Health Organization (WHO) for health, resulted by the high consumption of chemical fertilizers, pesticides, and herbicides (Chaychi, 2010). Although the field have witnessed the enactment of many necessary

Table 3
Environmental Degradation of Water, Soil and Air resources in Iran Over Time

Item	Parameter (unit)	Phase 1	Phase 2	Phase 3
Water	Groundwater level (meter)	-1	-8	-18
	Annual precipitation mean (millimeter)*(1/3 of the world mean)*	250	250	250
	Illegal water wells (number)	-	100,000	338,000
Soil	Soil erosion (ton per year)	-	1,500,000,000	1,500,000,000
	Chemical Fertilizer (ton per year)	36,000	1,699,098	4,574,238
	Nitrogen (ton)	18,258	872,433	2,511,989
	Phosphate (ton)	16,705	812,400	1,244,861
	Potash (ton)	1,307	14,265	378,162
	4Cultivated lands (hectare) *(Fars as a case)*	-	500,000	1,720,000
Air	Air Pollution Mean *(Tehran as a case)*	-	75	158

*(Ministry of Agriculture Jihad, 2012; FAO, 2011; Hajjari Zadeh & Parvin, 2009; Askari & Rahim Zadeh, 2006)

systematic purposeful rules, laws and research (third phase) as well as environmental movements in terms of NGOs (Rezaei-Moghaddam & Karami, 2008a), reflecting the public's environmental awareness and concerns, but such activities are still insufficient. It needs more applicable environmental rules rising from the main problems in the nation, more severity on the rules enforcement as well as the strong public determination in terms of moving toward a sustainable development. Iran has encountered many environmental crises especially in water and soil management due to inappropriate agricultural activities. Four specific cases of these crises has been mentioned as follows.

Case 1- Water crisis in Iran: Assessing renewable water resources per capita as a water stress indicator

Iran is an arid and semi-arid country with annual precipitation of around 240-250 mm, which is one-third of the world average. Annual water resources per capita have a decreased trend during this time; they were 2506, 2104, and 1859 m^3 per capita in 1990, 2000, and 2010, respectively (FAO, 2014). Renewable water resources per capita in Iran were 1830m^3 in 2012 (Mokhtari, 2012), so Iran's renewable water resources are about to approach a crisis based upon the Falkenmark water stress indicator. The index thresholds of 1,700m^3 and 1,000m^3 per capita per year are used as the thresholds between water stressed and scarce areas, respectively (Falkenmark & Widstrand, 1989; Brown, 2011). Due to the lack of precipitation, the region relies heavily on irrigation for its agricultural production. Iran has the largest area equipped for irrigation at over 9 million hectares (FAO, 2014). There is a downwards trend with a high slope in the variation of groundwater level over past 50 years. The mean change in the decrease of water in 1974 was 5 times more than in 1962 (Figure 2). In 2005, it was 6.4 and 32 times more than in 1974 and 1962, respectively (figure 2). This parameter in 2014 is 1.2, 7.6, and 38 times more than its amount at the end of the previous phases (2005, 1974, 1962), respectively. On the other hand, 90.1% of groundwater resources in Iran are consumed in agriculture and the rest are for municipalities (8.3%) and industry (1.7%). Thus, the largest part of groundwater extraction is for agricultural use (FAO, 2014).

According to Figure 3, the renewable water resources per capita in 11 provinces of Iran are less than 1700 m^3. Tehran, the capital of Iran, and Qom are two provinces in the absolute scarcity stage with less than 500 m^3

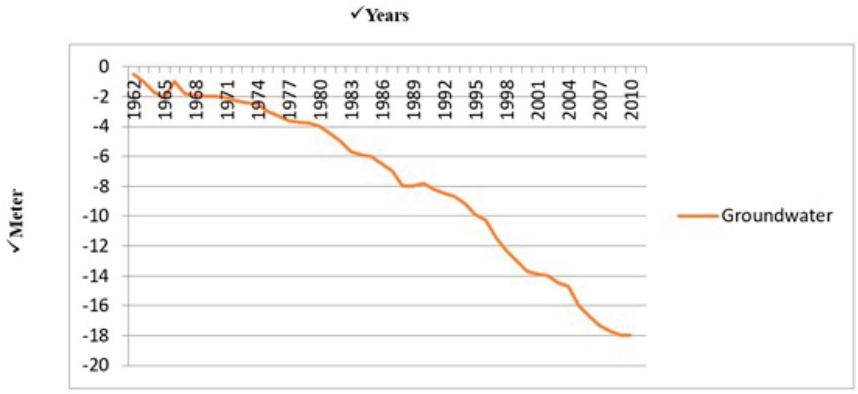

Figure 2. Trend of Groundwater Level of Iran Over Time

per capita. This parameter is between 1000-1700 m^3 in the 9 other provinces, which are in the Stress stage. The remaining provinces are in the no stress stage, but in terms of low precipitation, drought and high rate of population, the crisis of water resources will worsen. In 2010, Iran was among the top 20 countries in freshwater withdrawals by the agricultural sector (FAO, 2013) with more than 90%, and the rest for municipalities (4.7%) and industry (1.3%) (FAO, 2014), through which water management in the agriculture sector has a significant role in crisis management. Renewable water per capita in Iran will be 1530 m^3 (stress stage) in 2025 according to Mokhtari (2012).

Case 2- Mismanagement of Water Resources: Drying of Urmia Lake

Urmia Lake is an endorheic salt lake in west-northern Iran in Azerbaijan province and near Iran's border with Turkey. The lake is between the provinces of East Azerbaijan and West Azerbaijan in Iran, and west of the southern portion of the Caspian Sea. At its full size, it was the largest lake in the Middle East and the sixth-largest saltwater lake on the Earth with a surface area of approximately 5,200 km^2 (2,000 $mile^2$), 140 km (87 mi) length, 55 km (34 mi) width, and 16 m (52 ft) depth. It is one of the most significant and valuable ecosystems of Iran due to the natural and ecological features. This lake has both aquatic and terrestrial ecosystems including 102 islands. Urmia Lake is protected as a national park by the Iranian Department of Environment since 1966 and it has globally become one of the biosphere reserves regarding the UNESCO`s Man and Biosphere (MAB) Program (Ahmadian & Asghari, 2014).

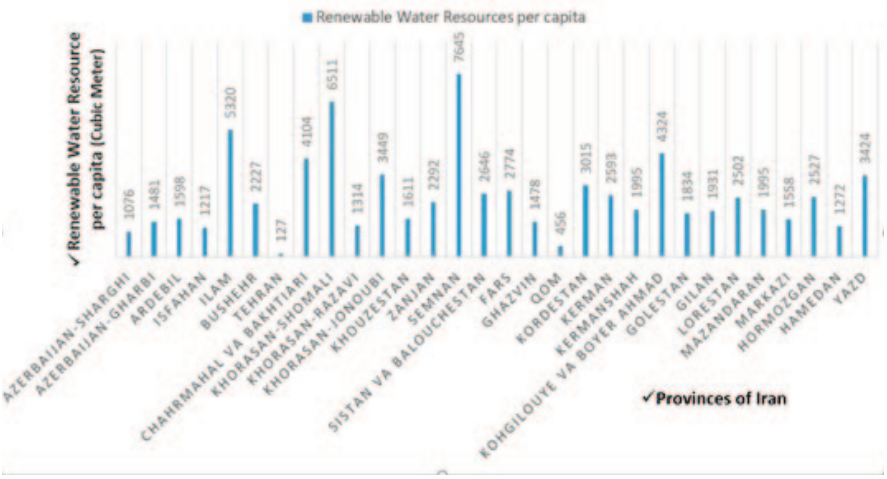

Figure 3. The Index of Renewable Water Resources Per Capita Among the Provinces of Iran in 2012 (Mokhtari, 2012)

The water level of Urmia Lake was the highest in 1995 and since then it has faced a decreasing trend to the present time. The lowering of the water level has intensified in recent years and currently is the worst in the past 50 years. Eighty-five percent of the lake has dried and it has shrunk to almost 10 % of its former size due to damming of the rivers flowing into it and pumping of groundwater from the area. At the present time, the lake level is 1270.65 cm, it has shrunk up to 120,000 kilometers and 5 islands have converted to the mainland (Jabbari et al., 2010). Along with natural factors such as rainfall shortage and drought in the past 10 years, the main causes of this environmental crisis have been attributed to human destructive activities, especially inappropriate management of agriculture. Indeed, ignoring the stakeholders` participation and other human factors in agricultural sector is the most essential problem which is worsening the condition. High agricultural growth in the area and inappropriate use of surface and groundwater resources (extracting 400 million cubic meters' water) including construction of 24,000 illegal wells (Ahmadian & Asghari, 2014) and the lack of a clean modern irrigation system (Lak & Darvishi-Kahtooni, 2012) have worsened the condition. This situation has threatened the wildlife of the area, as well. The conflict among the interests, goals, and strategies of different stakeholders is the main cause of ineffective water management (Bijani et al., 2013). Apparent and hidden conflicts between government and farmers as well as inability to manage these conflicts has led to the poor management of natural national heritage (fossil) of Azerbaijan province in Iran (Zeinali, 2014).

Case 3- Mismanagement of Land Resources: Inappropriate Land Use Change in Fars Province

Official statistics show an extensive rate of land use change in Iran. In the Fars Province, the area of cropping land increased from 500,000 to 1,720,000 hectares in 30 years (Ministry of Agriculture Jihad, 2012). This constitutes one of the major drivers of land use change. Transformation of pastures to agricultural use was the most common land use change in this province. This transformation is especially due to a new phenomenon called *'City Garden'* collectives. Establishment of these ranch-style gardens for recreational use in villages around large cities has recently become fashionable. Changes in the land use has resulted in an unexpected reduction in the amount of natural resources and pastures for agricultural purposes in the Fars Province. Based on the results of a study which was conducted in Fars province by Fatemi et al. (2017), cropping lands increased more than 40% in the past three decades.

These kinds of land use changes have occurred without any land use planning base and in most cases have been done illegally by the farmers. Therefore, it has negative effects on natural resources including pastures and ranchers' works as well as higher pressure on water resources due to agricultural intensification. On the other hand, reducing agricultural lands in some parts of the province owing to the conversion of cropping land to the small pieces of gardens for hobby farming, has negative effects in rural areas, e.g., unemployment of rural youth, increased immigration from rural areas to the cities as well as making villages passive places including old, retired, and illiterate people without any attraction to live (Khatir & Rezaei-Moghaddam, 2014).

Case 4- Overconsumption of Natural Resources: Ecological Footprint Analysis

The Ecological Footprint (EF) is a resource accounting tool due to the human-nature relations that uses prevailing technology and resource management schemes to measure how much biologically productive land and sea are used by a given population or activity, and compares this to how much land and sea are available (Kitzes & Wackernagel, 2009). EF generally is used for ecological capability assessment and final EF as well as sustainable development (Zhang, 2005). The National Footprint Accounts (NFA) program that was initiated by Global Footprint Network in 2003, contains two measures consisting of *Ecological Footprint,* as a

measure of the demand populations and activities place on the biosphere in a given year, given the prevailing technology and resource technology and resource management of the year, and *Biocapacity,* as a measure of the amount of biologically productive land and sea are available to provide the ecosystem services that humanity consumes the nature's regenerative capacity (Borucke et al., 2013; Passeri et al., 2013). Sustainability would be realized by the comparison of these two parameters. The biocapacity and EF of the world equaled 1.8 and 2.2 acres per capita, respectively (WWF, 2006). These measures are 0.84 and 2.66 acers per capita in Iran (WWF, 2006; Borucke et al., 2013; Fatemi et al., 2018). The figures show the exploitation by human activity on the environment, and the EF is three times more than biocapacity in this country. This can improve managers' abilities to incorporating feedback from environmental impacts into decision-making.

The natural resources consumption of some of the countries based on the comparison of two mentioned ecological indices (BC and EF) have been shown in table 4. As it could be understood, Iran and most of the middle-east countries are the categorized as debtor countries. It means that their consumption of natural resources (EF) in these countries are greater than the nature's regenerative capacity (BC). The range of negative amounts less than zero as ecological deficit of these countries could be seen in Table 4. Since EF and BC are land-based indices, it could be seen that the smaller countries like U.A.E., Qatar, Kuwait, and Bahrain have the most ecological deficit in the list which means that the country lands are not sufficient for the population needs. On the other hand, there are some countries like Canada, Australia, and Brazil with better ecological condition which means their EF is less that BC and they are categorized as creditor countries with ecological reserve.

The trend of EF and BC of pasture has been shown in figure 4b. It could be realized that the land management of pastures has been neglected in Iran over time, as the BC trend was reduced from 0.34 to 0.06 gha in the timeline of the study, which means that the managers and experts of natural resources organizations did not work to increase the pastures' capacity. The EF and BC was almost equal around 0.3 gha in 1960s. The EF level exceeded the BC in 1970 and this trend continued while there is a downward trend for the both indices over time (Figure 4b).

CONCLUSION

Environmental management will permit the communities to choose and control their environment. This also addresses ethical issues of individuals and societies. The countries have embarked to reckon the regulatory ship of state toward a destination of effective environmental and natural resources management. Their argument has been less a product of the failure of the

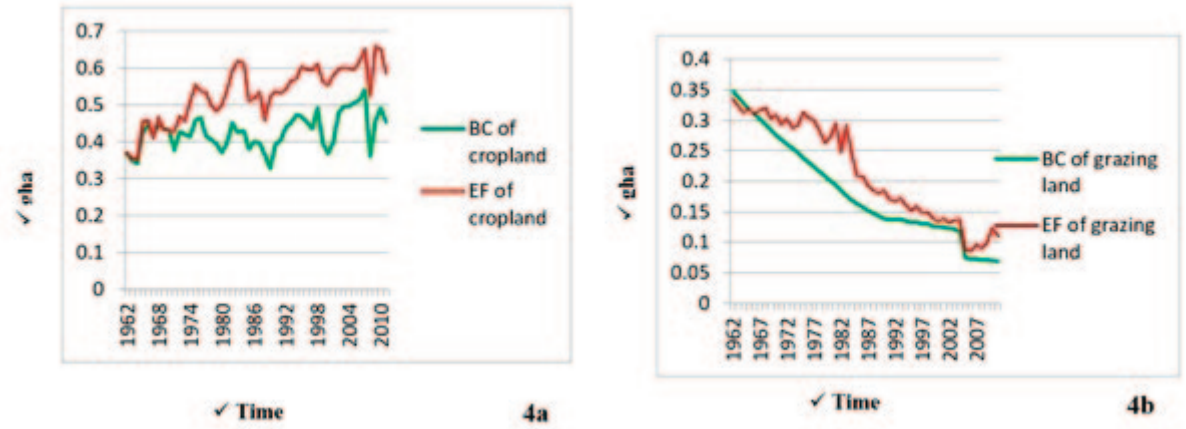

Figure 4. Trend of EF Consumption and BC in Agriculture (4a) and Pasture (4b) of Iran in the Study Timeline of 1962- 2011 (Fatemi et al., 2018; Global Footprint Network, 2016)

Table 4
The EF and BC of Iran and Some other Countries

Country	EF per capita (gha)	BC per capita (gha)	Ecological deficit/reserve
Iran	2.66	0.84	-1.82
Afghanistan	0.54	0.40	-0.14
Pakistan	0.75	0.40	-0.35
Iraq	1.42	0.24	-1.18
Armenia	1.73	0.72	-1.01
Azerbaijan	1.97	0.72	-1.25
Bahrain	6.65	0.69	-5.96
Kuwait	9.72	0.43	-9.29
Qatar	11.68	2.05	-9.63
U.A.E.	8.44	0.64	-7.80
Saudi Arabia	3.99	0.65	-3.34
Turkey	2.55	1.31	-1.24
Oman	5.69	2.20	-3.49
Russia	4.40	6.62	+2.22
Syria	1.45	0.57	-0.88
Tajikistan	0.90	0.56	-0.34
Turkmenistan	3.98	3.19	-0.79
Uzbekistan	1.82	0.91	-0.91
India	0.87	0.48	-0.39
China	2.13	0.87	-1.26
Korea	1.31	0.62	-0.69
Thailand	2.41	1.17	-1.24
Indonesia	1.13	1.32	+0.19
Philippines	0.98	0.62	-0.36
Lebanon	2.85	0.39	-2.46
Malaysia	3.90	2.50	-1.40
Ukraine	3.19	2.23	-0.96
Algeria	1.65	0.56	-1.09
Egypt	1.70	0.65	-1.05
Venezuela	3.02	3.00	-0.02
Vietnam	1.39	1.09	-0.30
Yemen	0.87	0.60	-0.27
Brazil	2.93	9.63	+6.70
Canada	6.43	14.92	+8.49
Australia	6.68	14.57	+7.89

(Borucke et al., 2013; Global Footprint Network, 2016; Fatemi et al., 2018)

earlier regulatory paradigm. The scientific enterprise depends on paradigms or disciplinary matrix. Indeed, the science philosophy is to investigate and analyze the paradigms dominant on the issues to discover their failures and then reach a more practical paradigm. In the age of environment, or ecological age, paradigms of the relationship between environmental management and development are in a period of flux. The paradigms and worldviews presented in this study are not separate entities. There are three main paradigmatic perspectives in environmental management debates including *technocenterism, biocenterism, and ecocenterism*. It views humans as one of many species in nature while accepting world's

physical and biological limits (Cornell, 2011; Ehrich, 2002; Paterson, 2006). Finally, ecocentersim as the third perspective, believes that social relations complement man-environment interactions (Adams, 2009). It was contended that development and the environment form a dialectical union, the separation of which would bring harmful results for social development (Glaeser, 2000). This paradigm moves from economizing ecology towards ecologizing the economy, or the whole social systems. Based on the conflict between anthropocentric and biocentric values, it attempts to synthesize ecocentrism, i.e., refusing to place humanity either above nature or below it (Fatemi & Rezaei-Moghaddam, 2019).

There is an inappropriate paradigm in environmental management thinking of Iran in terms of sustainability as well as an inconsistency between environmental paradigms and strategies in different periods of time. The researchers challenge the assertion of frontier economics paradigm that natural resources are infinite. The proponents of this paradigm believe that the environment can be considered within the governing economic paradigm. The remedial agenda is breaking down because of its ineffectiveness in dealing with the negative consequences of unmodified frontier economics and development. The widespread perception is one of tradeoffs between environment and development. Rethinking in the paradigm of environmental management is a necessary point in order to move on the path of sustainability. We argued that the values underlying technocentrism and their environmental management paradigms, i.e., frontier economics are human-centered and less likely to act as an effective environmental management to protect the environment. Ecocentric thinking will act as an environmental management to conserve the environment of Iran. A suitable paradigm and strategy should emphasize the intrinsic rewards of environment and natural resources. In this paradigm primary human needs are met first and foremost, whereas the needs of other ecosystems are allowed to prevail over secondary human needs.

Environmental problems mostly have been confronted by independent strategies in Iran like polluter pays or passing a specific law that was not effective, so far. By systematically politicizing agricultural environmental management in Iran, there is a tendency to favor quantity, not quality, of politics, resulting in reproducing the exclusions and narrow previous politics. The plurality of laws, rules and regulations enacted in short time intervals, sometimes several laws in a year, leads to poor planning in order to achieve appropriate implementation. It is necessary to move towards integrated and participatory strategies in a comprehensive perspective which are including a package of appropriate and divers action plans. In another view, institutionalized limitations could also provide further challenges in the scope. The organization of environmental conservation of Iran, as the main trustee in environmental domain, do not have a systematic and defined collaboration with other governmental organizations, private sectors, and NGOs. It is important to institutionalize the elements of environmental protection and sustainability in the Iranian policy making procedures. It is necessary to emphasize the value of responsible organization in environmental management. The role of this organization changes from curative and reactive to preventive, and from closed policy-making to participative policy-making farmers, in which other stakeholders play a key role in organizational policies. Since deterministic viewpoint is the dominant framework of governmental organizations, negative effects on program planning and implementation are visible. Ignoring an effective conflict management in pluralization of different stakeholders' worldviews is an important challenge in the scope of environmental management. Accordingly, it is essential to consider the ability to manage the conflicts among different parties and to maximize the human and intellectual forces in agricultural decision-makings and plannings. The issue needs a comprehensive and systematic program for resource management in Iran. In this case, agriculture would be treated as a natural process in line with environment preservation and sustainable development.

The dominant scenario of agricultural technology development of Iran is based on "high-input and high-output" which has great pressure on natural resources and leads to unsustainability intensification. It is required to change the main scenario of technology development to "optimized input-output" along with the paradigm shift from technocentrism toward ecocentrism. Due to the limited natural resources, systematic accounting approaches that quantify the human impact and pressure on the Earth, would be effective in terms of policies and decision making. The Ecological Footprint (EF) is a potential tool that would be able to make a quantitative connection between biocapacity and human utilization of resources. Exploitation due to human activity would be realized by the comparison of EF and BC parameters. Thus, it is suggested that research trends as a basis of future policies and decision making move towards EF accounting in all areas, especially in agriculture in terms of achieving comprehensive environment management. Calculation and comparison of current ecological supplies and demands as well as historical trends in these parameters over time, are supposed to serve as a route map in determine goals, planning choices for appropriate activities and proper alternatives in the program's implementation. As result via achieving the related goals, agricultural sustainability and comprehensive development would be more tangible.

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