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Research Article

Comparative Study of Environmental Challenges of Urmia Lake and Aral Lake in order to Protect and Rehabilitate Urmia Lake

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Abstract
One of the main issues of the present age is the environment and understanding its significant contribution to our lives. The environment has currently found a special place and importance. Wetlands are one of the most valuable ecosystems on earth, offering a wide range of biodiversity. The Ramsar Convention on Wetlands was signed in 1971 due to the special status and value of this ecosystem. One of the largest wetlands on the list of conventions is Lake Urmia, which Iran has committed to protect and use reasonably. However, natural and human factors, including the construction of the Shahid Kalantari Highway and dozens of dams and the agricultural sector, have led to numerous environmental challenges such as the reduction of the lake area, and the reduction of the lake water level, and the production of harmful dust storms. Accordingly, the present study examined the domestic and international laws concerning Lakes Urmia and Aral to present a suitable solution for the environmental challenges of Lake Urmia, along with its conservation and rehabilitation.
Key-words: Ramsar Convention on Wetlands, Urmia Lake, Aral Lake, Environmental Challenges, Environmental Law

Introduction

Wetlands are among the most valuable ecosystems and natural resources, widely exploited worldwide in recent decades and faced with extensive environmental challenges and problems (Wassie, 2020; Padash, 2018). Wetlands have various definitions but are defined in Article 1 of the Ramsar Convention as areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters (Gokce, 2019; Wasserman and Dalu, 2022; Delle Grazie and Gill, 2022). Wetlands are the cradle of the world's biodiversity, contributing to the survival of countless species of plants and animals by providing

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water and a highly productive nature (Boussema et al., 2020). In addition to protecting biodiversity, they have natural, economic, and social values while playing a significant role in the control of irrigation systems, prevention of floods and storms, and supply of agricultural water (Kumar and Choudhury, 2021; Jisha and Puthur, 2021).

The Convention is the most important and the sole supervisory convention for the conservation of wetlands and commits all its member states, including Iran, to the wise use of wetlands (Norouzi et al., 2021). However, these rich ecosystems, especially Lake Urmia, face many risks caused by human and natural factors (Schmidt et al., 2021). In other words, insufficient water entry into the lake in recent years has exacerbated the process of the level, area, and volume reduction of the lake. The continuous drying trend of Lake Urmia and its negative effects on the climatic conditions, water resources, biodiversity, and natural environment of the lake and surrounding areas will lead to tangible and intangible damage to nature, local livelihoods, health, and well-being of the basin residents (Azarnivand et al., 2015). The present paper raises the following question: What are the barriers and environmental challenges of Lake Urmia?

Lake Urmia

An introduction to Lake Urmia

Lake Urmia is located in a natural depression within the catchment area on the border between the provinces of West and East Azerbaijan and northwestern Iran. This lake has an area of about 5000 km^2 with a maximum length and width of 140 and 50 km, respectively (See Figure 1). Lake Urmia is 1300 m higher than the water of the high seas, the 20^{th} lake in terms of area with an area of about 5000 km, and the second largest lake in terms of salinity in the world after the Dead Sea. The lake water is mainly supplied from 14 permanent rivers, including the Zarrineh River (41%), Simineh River (11%), Gadar (8%), Baranduz River (6%), Shahar River (2%), Nazlou River (6%), seasonal rivers, flood currents, springs, and direct rain and snow (Ahmady-Birgani et al., 2020; Alizadeh, 2021).

This wetland has two types of aquatic and terrestrial ecosystems, the former including saltwater of the lake and boulere adjacent to it. Lake Urmia is one of the largest natural habitats of Artemia, which is the only unicellular organism compatible with the salty water of Lake Urmia and also a suitable food for migratory and native birds of this wetland (Feizizadeh et al., 2022; Schmidt et al., 2021).

Environmental Challenges of Lake Urmia

According to the information on the website of the Ramsar Convention, the wetlands of 29 countries are currently on the Montreux list, and Iran, with 6 wetlands, ranks second in terms of endangered wetlands after Greece (Frazier, 1999; Gardner and Connolly, 2007). However, comprehensive management studies of Lake Urmia show that it will face a severe crisis in less than 20 years (Anbari et al., 2021; Danesh-Yazdi and Ataie-Ashtiani, 2019). In this research, the issue of environmental degradation is related not only to climate change, but also to human mismanagement in natural resources. The rapid drying of the lake (See Figure 2.) and the increase in salinity of the remaining water have already had catastrophic effects on the biodiversity structure of Lake Urmia ecosystem, and its continued retreat will eventually lead to the complete elimination of local species and the severance of essential food chains (Schmidt et al., 2021; Karbassi et al., 2010). This section deals with the internal and external threats affecting Lake Urmia.

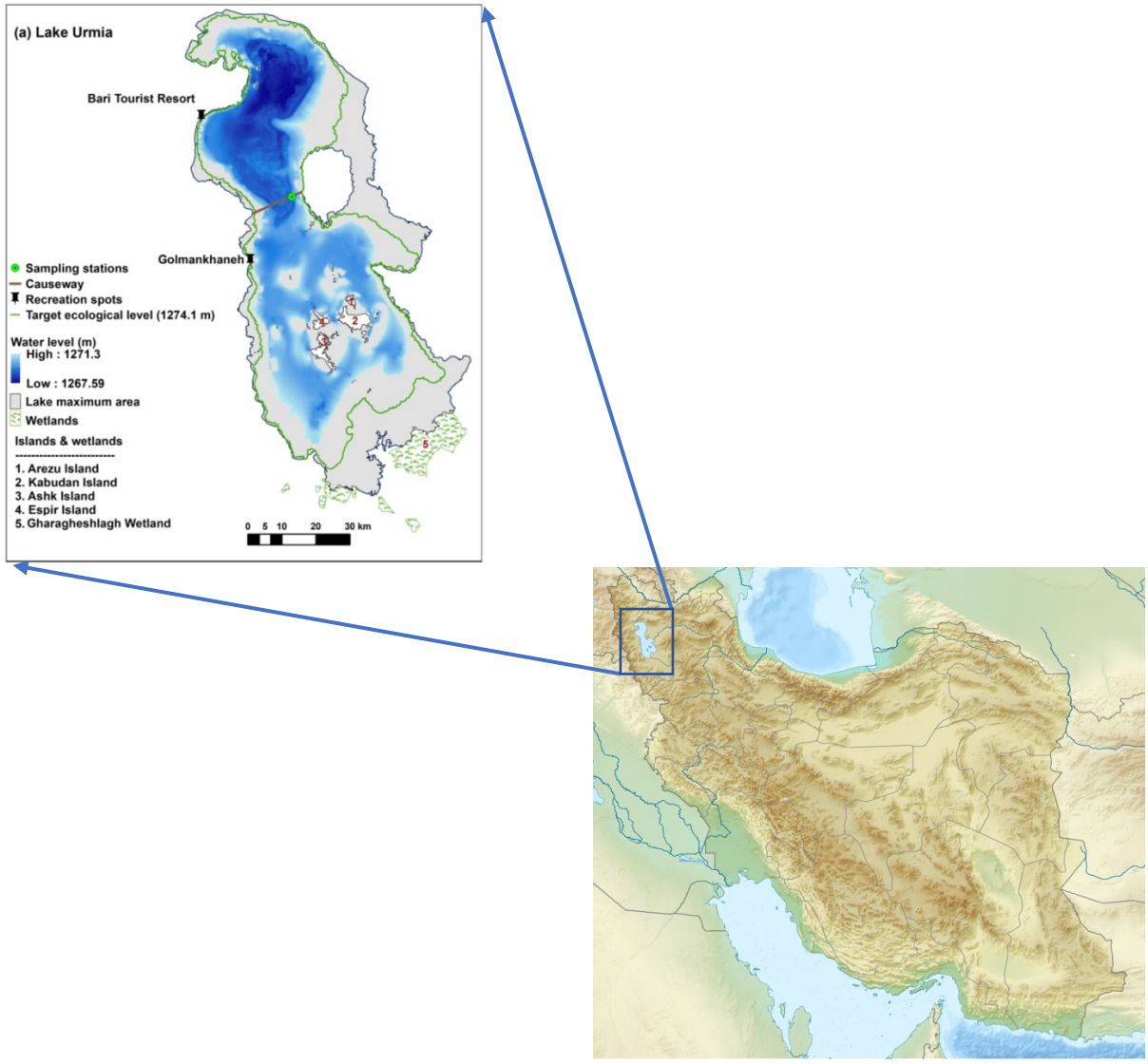

Figure 1. Location of Urmia Lake in Iran (Sima et al., 2021)

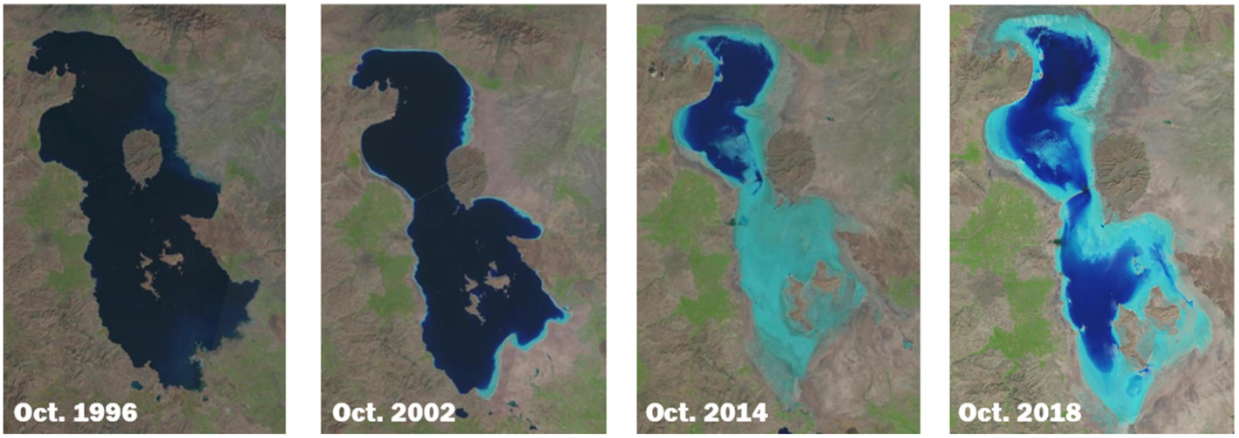

Figure 2. Temporal changes in the surface area of Lake Urmia, derived from Landsat imagery (USGS, 2019; Schmidt et al., 2021)

The Construction of Shahid Kalantari Highway

The 15-km Shahid Kalantari highway was constructed by drying 80% of the boundary between the western-eastern sides of the lake through a 12-km embankment, only less than 20% of which was constructed by iron structures with concrete foundations.
Construction of the highway disconnected the northern and southern halves, leading to natural and fundamental changes in the hydrodynamic and ecological characteristics of the lake region. Since 86% of the water enters the lake from the southern part of the highway, there are significant differences in physical and chemical properties, particularly sedimentation, of the northern and southern areas. As a result, the salinity of the lake water has dramatically increased, especially in the northern half, due to the lack of water exchange in the southern and northern parts, leading to the gradual disappearance of Artemia.

Also, the loss of habitat security for migratory and native birds and nesting far away from the highway are the result of the traffic, the penetration of pollutants into the lake, and noise pollution. Overall, environmental experts consider the construction of the Shahid Kalantari Highway through the lake, which aimed to bring the city of Urmia closer to Tabriz, as one of the influential factors in the destruction of this international wetland and the disruption of its environmental and ecological balance (Hemmati et al., 2021; Soudi et al., 2018; Ghalibaf and Moussavi, 2014; Zeinoddini et al., 2009; Kaynejad and Modarresy, 2007).

Agricultural Sector

Agriculture has allocated the highest consumption of surface and groundwater (87%) to itself in the Lake Urmia basin. The reduction in water consumption of the agricultural sector in the region is one of the main approaches considered by the Urmia Lake Rehabilitation Headquarters (Urmia Lake Restoration Program). The penetration of saline water due to natural factors reduced rainfall and surface inflow, and excessive exploitation of groundwater resources has seriously endangered large parts of agricultural lands. Agriculture has the first place in the economic cycle of this region (Pouladi et al., 2021; Danesh-Yazdi and Ataie-Ashtiani, 2019).

Overgrazing of Livestock

Free grazing takes place in nature regardless of even the most basic scientific principles related to the conservation of soil and vegetation. Overgrazing of domestic livestock (except sheep) in natural resources of this region is up to 10 times the carrying capacity of the world, adversely affecting many renewable resources of the region. Compaction of surface soil and excessive traffic of livestock has reduced soil porosity and permeability. Hence, not only are the seeds of most plants unable to grow in the soil, but the flow of running water leads to soil erosion and even flooding after each rainfall (Bayati and Danesh-Yazdi, 2021; Sivapalan, 2015).

Construction of Numerous Dams

According to the experts of the Iranian Department of Environment, the excessive construction of dams has led to the reduction of part of Lake Urmia water because dams control the flow of floods and direct water for exploitation instead of entering the lake. A significant volume of harvested water is allocated to agriculture, while the maximum efficiency of agricultural irrigation is 34%. In other words, 66% of the water extracted from rivers and wells and used by the agricultural sector

is lost and evaporated. Numerous storage dams under construction in the catchment area of Lake Urmia and most of the rivers leading to the lake have significantly increased the salinity of the lake. Hence, water salinity has exceeded the saturation point, and experts believe that the risk faces a potential risk of death (Pouladi et al., 2021; Balkanlou et al., 2020).

Consequences of destruction and pollution of Lake Urmia

Production of Harmful Dust

One of the main challenges related to the drying of Lake Urmia simultaneously with the decrease of its water levels was the increase of dust and salt storms from the sea level and the surrounding areas. One of the consequences of Lake Urmia drying is salt storms from the lake bed, affecting many areas within a radius of 75 km of the cities of Tabriz, Urmia, and Mahabad and within a radius of 511 km near Tehran, and imposing many losses on people. Accordingly, even a light wind would scatter a mass of different elements and compounds in the air and threaten the health of society seriously in addition to the decomposition of the agricultural and horticultural soil (Es' haghi et al., 2022; Shadkam et al., 2020).

Reduction of the Lake Water Level

During the last two decades, the water level of Lake Urmia has significantly decreased due to droughts and the high evaporation of water. The regression of the lake shoreline is not only of hydrological importance but also has a great impact on water quality, the environment, human health, and the economy. For example, water salinity has increased with the reduction of water volume, which is higher than the tolerance threshold of some animal species currently living in this lake. The water level of Lake Urmia decreased from 1276 meters in 1992 to 1270 meters in 2010 (Shadkam et al., 2020; Dastranj et al., 2018).

Lake Urmia Protection within the Framework of Iran's Domestic Environmental Law

Article 50 of the Constitution of the Islamic Republic of Iran

Article 50 of the Iranian Constitution is one of the main environmental principles and laws of the country, which is of great importance as a constitutional principle and in terms of its theme, holding that it shall be considered a public duty in the Islamic Republic to protect the environment in which the present, as well as future generations, shall have a developing social life. Therefore, economic activities or otherwise, which cause pollution or irreparable damage to the environment shall be prohibited.

Article 50 refers to the right to a healthy environment for the better growth of the present and future generations while also making an implicit reference to the right to a healthy environment for the better growth of the present generations and also sustainable development. Sustainable development does not harm the environment and allows future generations to benefit from it because the environment does not belong to a particular generation, but the present and future generations. Such a perspective brings forth a fundamental international principle called the common heritage of humanity. Article 50 considers environmental protection to be a public responsibility and not specific to a particular government or group (Papan-Matin, 2014; Nikkhah et al., 2018).

The Environmental Protection and Enhancement Act

The Environmental Protection and Enhancement Act (approved in 1974) contains 21 articles and 9 notes and is one of the most comprehensive environmental laws in Iran, covering all instances of the environment. This act aims to enhance the environment while preventing any kind of pollution and destructive action that disturbs the balance of the environment (Schwarte, 2003).

Article 6 of this Act considers the prevention of pollution and disturbing the balance of the environment and maintaining the ecological balance of nature as one of the main responsibilities of the Iranian Department of Environment and further emphasizes the need to protect the environment through natural phenomena and beautification methods.

The executive regulation of the Environmental Protection and Enhancement Act (approved in 1975) also emphasizes the need to protect the environment and avoid its destruction and interference. Article 8 of the Environmental Protection and Enhancement Act (approved in 1994) stipulates that any action that changes the ecosystem of the national park is forbidden. Meanwhile, Urmia Wetland has been registered as one of the most important national parks in the country since 1970 (Schwarte, 2003).

Environmental Acts from Law on the Fourth Five-Year Economic, Social, and Cultural Development Plan of the Islamic Republic of Iran

This law, approved by the Islamic Consultative Assembly in 2004, binds the government to comply with environmental regulations and considerations in carrying out economic activities and stipulates that the country's biodiversity indicators must approach the level of the global standard by the end of the Fourth Development Plan. Article 67 of this Act is dedicated to Lake Urmia and states that the ecosystem management program must be developed and implemented in sensitive ecosystems, especially Lake Urmia. Environmental laws and regulations of the Third Development Plan also emphasize the wise use and proper management of natural resources. As stated in Article 1040 of this Act, exploitation of natural resources must be according to the potential of resources. However, the use of water resources in the catchment area of Lake Urmia was beyond its potential and consequently caused the lake to dry up (Nikkhah et al., 2018).

International Environmental Law Related to Lake Urmia

The Principle of Environmental conservation and protection and the Ramsar Convention

One of the basic principles in international environmental law is the conservation and protection of the environment. It defines a superior obligation and a specific goal through a framework, obligating the government to cooperate.

According to paragraph 1 of Article 3 in the framework of the Ramsar Convention, the contracting parties shall formulate and implement their planning to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory. Also, paragraph 2 of Article 3 stipulates that each Contracting Party shall arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing, or is likely to change as the result of technological developments, pollution, or other human interference (Shelton, 2021; Gardner and Davidson, 2011; Bridgewater, 2008).

The Principle of Cooperation

Countries cannot deal with their environmental issues alone and require the cooperation and assistance of other members of the international community. Accordingly, it can be argued that the legal domain of the environment has an international dimension in all areas. Principle 24 of the Stockholm Declaration states that "International matters concerning the protection and improvement of the environment should be handled in a cooperative spirit by all countries, big and small, on an equal footing." Principle 7 of the Rio Declaration also emphasizes that “states shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem” (Roosa, 2020; Padash et al., 2019).

The No-Harm Rule

Governments have sovereignty over their territories, which means that a state has legislative jurisdiction within its territory. In other words, the government is the only power that can enforce binding legal rules in its territory. Principle 2 of the Stockholm Declaration stipulates that the states have a sovereign right to exploit their natural resources according to their environmental and developmental policies under the Principles of International Law Recognized by the Charter of the United Nations. Principle 2 of the Rio Declaration also emphasizes that “States have, under the Charter of the United Nations and the principles of international law, the sovereign right to exploit their resources according to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or areas beyond the limits of national jurisdiction” (Hobe, 2015; Pallemaerts, 1992; Barberis, 1991).

Aral Sea

An Introduction to Aral Sea

The Aral Sea is one of the greatest landlocked saltwater lakes in the world, located in Central Asia. In 1960, the Aral Sea was the fourth largest landlocked mass of water in the world with an area of more than 67000 km^2. With an average salinity of 10 g/l, this lake was the habitat of most freshwater species. It also provided the region with fisheries and formed one of the main regional transportation routes. The Amu Darya and the Syr Darya had a stable flora and fauna diversity while also supporting agriculture under irrigation, animal husbandry, hunting, fishing, and straw harvesting.

The catchment area of the Aral Sea consists of a surface area of 1544900 km^2, with approximately 590 km^2 of arable land. The Aral Sea is in the heart of the vast deserts of Central Asia at an altitude of 35 m above sea level and acts as a huge evaporator (See Figure 3). Around 60 km^3 of water per year evaporates from the surface of the lake and the rivers connected to it.

The size and water balance of the lake are mainly determined by the inflow of the river and the surface evaporation. Over the past four decades, this body of water has shrunk rapidly and uniformly and become saline as countries in the Aral Sea basin increasingly extract water from its two feeding rivers, the Amu Darya and the Syr Darya, for irrigation (Turner, 2003). The portions of the Aral see basin lie in Afghanistan, China and Iran (Vinogradov and Langford, 2001).

(a) (b) (c)

Figure 3. (a) Location of Aral Lake in Central Asia; (b) The Aral Sea in 1981; (c) The Aral Sea in 2014

Environmental Challenges of the Aral Sea

Single-Product Economy and Management Inefficiencies

During the Soviet period, the Central Asian region had the task of producing raw materials and agriculture, especially cotton cultivation, due to the need for agricultural raw materials in the Soviet Union's national plan based on the task division among the republics. Subsequently, large-scale cotton cultivation began in the region using the integration of the entire region's irrigation system at the macro level, which continued during the seven decades of the Soviet Union's reign, producing 90% of the cotton needed by the Soviet Union. Extensive cotton cultivation led to the single-product economy of the region, resulting in more complexities in the management issues. The single-product economy based on cotton cultivation brought about a fragile economy and low incomes. Although water consumption in the industry could generate more revenue for the region, the lack of infrastructure and technology in the development of the industry, together with excessive cultivation, put more pressure on water resources to increase revenue. For example, water production capacity in the region decreased by nearly 8 million m^3 between 1994 and 1990, while agricultural land increased by about 700000 hectares in the same period. (Micklin, 1994).

Inefficient Management and the Division of the Lake into Two Separate Parts

In 1987, the sea was divided into the Great Sea (Bolshevik) and the Small Sea (Malawi), and the salinity of the remaining water increased by 450% (MacLean, 2001: 149). Desertification has currently expanded, salinity-resistant vegetables have replaced salt-sensitive native species, and native bird and duck populations are endangered or extinct.

Unbalanced Distribution of Water Resources in the Region

Another important factor is the unbalanced distribution of water resources in the region. Tajikistan and Kyrgyzstan are the sources of water for the Aral Sea basin due to their location in the highlands of the Hindu Kush and the Pamir Mountains. The Amu Darya in Tajikistan and the Syr Darya in Kyrgyzstan, the region's two main water sources, and the Aral Sea originate in these two countries,

while Turkmenistan, Uzbekistan, and Kazakhstan have a negligible role in the water supply. The largest share of water production for the Amu Darya is allocated to Tajikistan with 75% of the total water volume, while Turkmenistan and Uzbekistan have the highest water consumption despite producing less than 3% and 9%, respectively. The two countries consume 35.8% and 48.2% of water, respectively, but Tajikistan consumes only 15% of the volume of water. The situation is similar in the case of Syr Darya, but with the difference that Kazakhstan replaces Turkmenistan. Kyrgyzstan supplies 74% but consumes less than 1% of the river water, while Uzbekistan and Kazakhstan have allocated 50% and 42% of the river water to themselves, respectively (Rakhmatullaev et al., 2013). This unbalanced distribution can be due to the geomorphological structure of the region, the lack of capacity to exploit water in the production process of the upstream countries, and the integrated use and higher share of the downstream countries, especially Uzbekistan. Another obstacle is the establishment of a fair water harvesting regime in the region.

Consequences of the Aral Sea Destruction and Pollution

Temperature Rise

The destruction of the Aral Sea has also contributed to the unbalance of the region. The average temperature was 14 °C warmer in the Aral region in June 1988. During the Soviet era, the frequency of sunny and warm days was higher, the temperature increased by about 15%, and the growing season of the plants decreased by 170 days (Nagarajan, 2010).
In addition, grassland exploitation decreased by 50%, the rate of surface water evaporation increased significantly, and the humidity decreased by 10% compared to the rate of 50 years ago. These dramatic changes led to a reduction in the quality and quantity of the cotton crop (Micklin, 1994).

Sandstorms

The drying up of the lake has led to strong winds, sandstorms, and dust storms, most of which contain salt residues. Downstream populations exposed to the wind, sometimes hundreds of miles away, inhale these toxic and carcinogenic substances, resulting in increased neonatal mortality, respiratory diseases, lung cancers, tuberculosis, and hepatitis.

Destruction of Glaciers

Glacial valleys in the Tien Shan region have an annual retreat of 7.5-13 meters. Glaciers' retreating and disintegration can be very dangerous and lead to long-term consequences because they are the only old surviving sources of freshwater supply in the region. The destruction of these glaciers has exacerbated water shortage and may even pose a security threat and tensions in the region over these scarce resources (Peachey, 2004; Roll et al., 2003)

Components of the Legal Strategy for the Management of International Waterways in the Aral Sea Basin

The Comprehensive Aral Sea Basin Program (ASBP)

The comprehensive Aral Sea Basin Program was approved in January 1994 by five Central Asian countries. The main goal of the program is the comprehensive management of the nature and the

issues contributing to the Aral Sea crisis. This program has a cross-border and multi-sectoral nature and includes activities to develop water management and sustainable biotic resources, improve basic information of all planning and management activities, eliminate the impact of environmental degradation, improve conditions in upstream catchments and adjacent areas, and strengthen the executive capacity in the competent organization of the region (Micklin et al., 2016; Rice, 2012).
The comprehensive Aral Sea basin program has four long-term objectives:

1. To stabilize the environment of the Aral Sea Basin,
2. To rehabilitate the Disaster Zone around the Sea,
3. To improve the management of the international waters of the basin, and
4. To build the capacity of regional institutions to plan and manage these programs.

The Necessity to Avoid Conflict Over Water Use

Five Central Asian countries signed medium-term agreements and formed an institution to share the water and avoid conflict over water issues. All the countries were aware of the need to develop an appropriate institutional and regulatory framework to deal with water shortage problems. This framework recognized the need for cooperation among the five countries and their coordinated action to deal with the catastrophe. All five countries faced huge economic changes, and water consumption had to be considered in the context of these economic changes. For example, countries had different needs for water resources, especially upstream countries for hydropower and other countries for agricultural use (Lee and Jung, 2018).

The 1992 Convention on the Management, Protection, and Use of Transboundary Watercourses

In the former Soviet Union, inter-state water resources were centrally managed by the Ministry of Water Management. Water consumption plans were developed based on annual water withdrawal limits for the Syr Darya and Amu Darya basins. These plans were developed based on the conditions of agricultural products and did not pay much attention to water quality. The countries entered into a series of bilateral and trilateral agreements to reform the allocation of water in these plans due to seasonal changes and fluctuations (Vinogradov and Langford, 2001).
All five countries claimed an equal share of water resources, but at the same time acknowledged that this could only be achieved through international negotiations. Consequently, the five Central Asian states jointly declared on September 12, 1992, that joint management of water resources would be the basis for joint and equal use. They subsequently concluded the Cooperation Agreement in the field of management, utilization, and protection of transboundary water resources on February 18, 1992, thus committing themselves to the cooperative management of water in the Aral Sea basin (Micklin, 2002).

Reenforcing the Interstate Cooperation

Four intergovernmental institutions were established between 1993 and 1995 to reinforce cooperation among the five countries. These institutions are as follows:

The Interstate Council on the Aral Sea Basin intended to set policy, provide intersectoral coordination and review the projects and activities conducted in the Basin, the Executive Committee aimed to implement the Aral Sea Program, the International Fund for the Aral Sea intended to collect contributions from the five states and donors, and the Sustainable Development Commission aimed to ensure that economic, social and environmental factors would be given equal

weight in planning decisions. The establishment of these new institutions contributed to strengthening the willingness, and more importantly, the framework for the five countries to jointly decide on water management issues (Vinogradov and Langford, 2001).

Bilateral and Multilateral Agreements

A complex system of water storage system was established in the Syr Darya and Amu Darya basins to primarily accumulate water in winter for its subsequent use in summer, particularly for irrigation and electric power generation. The countries also concluded bilateral and multilateral agreements to modify the water allocations because of seasonal variations.
The Kyrgyz Republic faced an abundance of water and hydro operations, along with severe energy shortages in the winter since its independence. Downstream countries, including Uzbekistan and Kazakhstan, had agricultural-dependent economies with high water demand during the summer months, while their upstream neighbor needed water release in the winter to meet energy demands. Uzbekistan, Kazakhstan, and the Kyrgyz Republic entered into a series of annual contracts for water and energy exchanges to deal with this issue.

The Kyrgyz Republic agreed to reduce water release during the winter months, while Uzbekistan and Kazakhstan agreed to provide this country with electricity and fossil fuels during the winter (i.e., water storage for irrigation and energy generation in the summer and coal and gas delivery in winter) (Boisson de Chazournes, 1998).

1. Solutions to the Problem of the Shrinking Aral Sea

- Optimizing the quality of irrigation canals (Bekchanov et al., 2016),
- Using cotton that requires little water (Forkutsa et al., 2009),
- Cotton rotation with other crops,
- Supporting farmers in river water utilization (Martius et al., 2004), and
- Establishing dam facilities to fill the Aral Sea (Rajabi, 2012).

2. Solutions to the Environmental Challenges of Lake Urmia for its Protection and Rehabilitation

The assessment system of the environmental impacts resulting from the implementation of water development plans needs to be upgraded.
Therefore, Iran should upgrade the environmental impact assessment system with a focus on the wise utilization of the Lake Urmia wetland and the following goals:
- Determining the irrational exploitation activities in Urmia wetland,
- Reducing or eliminating these harmful activities in the wetland,
- Conducting expert analyses regarding the minimum possible development activities with no damage to the ecosystem of Urmia wetland, and
- Establishing and promoting public participation.

Experts believe that the key to the success of wetland protection is the establishment and promotion of public participation, especially in local communities, in decision-making and supervision of plans and projects. Wetland conservation and rational utilization are the responsibility of all. Conservation responsibilities also include governmental and non-governmental organizations, the private sector, and special stakeholders such as farmers (Zinngrebe et al., 2020; Selman, 2004).
- Finally, stopping illegal water withdrawal is one of the important tools for lake protection.

Conclusion

Since the environment is a capital, and our interference in it should be according to the requirements of the future generations, the present study considers the unique ecology of Lake Urmia, which is the cradle of biodiversity and a valuable wetland registered in the Ramsar Convention but facing environmental challenges due to human and natural factors.

Hence, the present paper performed a comparative legal investigation of the environment of Lakes Urmia and Aral for Lake Urmia conservation and rehabilitation. The study considered the environmental challenges of Lake Urmia, including temperature rise and evaporation, the construction of dams on the river, backfilling for the construction of Shahid Kalantari Highway, overexploitation of surface and groundwater, and economic development with severe damage to the lake environment, which is contrary to Article 50 of the Constitution. It also investigated the environmental challenges of the Aral Sea, including the single-product economy, the division of the lake into two separate parts, and unbalanced water distribution. The main steps in the protection and rehabilitation of Lake Urmia included the comprehensive Aral Sea Basin Management Program, environmental assessment before the start of the projects, raising public awareness, and the use of technologies.

Finally, a legal framework can be developed for the protection and rehabilitation of Lake Urmia and conservation of its unique ecosystem with the help of international experiences such as environmental conventions, environmental laws of lakes and wetlands of other countries, etc.

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