

Analysis of Influence of Environmental Crisis in the Lake Urmia Basin on the Middle East

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Abstract

Although all of the existing water resources and lakes in the world are not suitable for agriculture, their preservation plays a very decisive role in preventing environmental disasters. Unfortunately, water sources in many countries are not strictly protected and are in danger of drying up as a result of artificial factors. Lake Urmia located between East and West Azerbaijani provinces in Iran is one of these lakes. Since the 1990s of the last century, the water level in Lake Urmia, which is considered one of the largest lakes in the world in terms of salinity, has decreased and is currently facing the threat of drying up. The complete drying of the lake will not only damage the ecosystem in the region, its side effects may also manifest in neighboring countries and the whole Middle East region. This process will also accelerate the migration flow from the region to other provinces and neighboring countries. Thus, the lake crisis in Urmia is hazardous for the entire region. The purpose of this study is to reveal the main causes of drying lake, predict threats emerging in the region and look for solutions to eliminate this crisis.

Keywords: Environmental Crisis; Lake Urmia; Iran; Azerbaijan; Middle East

Introduction

Lake Urmia as one of the most saline lakes over the world is protected as a UNESCO biosphere reserve.¹ The lake is considered the greatest lake in the Middle East region with a surface area of approximately 5,200 km². It is mostly known as lake “Urmu” among the native population. The area around the lake has historically populated by the Azerbaijanis. Now, Azerbaijani population is majority on both sides of the lake. Consequently, the lake has a symbolic character for local residents of the region, which means the Pearl of Azerbaijani Nature for all the Azerbaijanis over the world.

Lake Urmia basin is considered the cradle of civilization in Azerbaijan.² Thus, the right shores of the lake, especially the city of Tabriz, has historically been the political center of great powers. This region was a very important military and political center either in the ancient times or during the Middle Ages. The historical importance of the region lies in the fact that it is possible to easily control the neighboring countries from here. Consequently, most of the dynasties that replaced each other in Azerbaijan since the 9th century, including the Sajids, Salarids, Ravvadis, Eldiguzids (Atabegs of Azerbaijan), Jalariyids, Kara Koyunlu, Ak Koyunlu and Safavids, chose the city of Tabriz as capital. Thus, Lake Urmia has historical significance for Azerbaijanis and is considered a symbol of national unity.

In 1925, the Pahlavi dynasty took the throne of Iran and began to pursue a policy of discrimination against the Turkic peoples in all spheres of society throughout his rule.³ After the

overthrow of Turkic Qajar dynasty, the names of many historical places in Azerbaijani provinces, including the lake were changed. Historical name of the lake was restored by the National Government of Azerbaijan in 1946. When it was overthrown by the Pahlavi regime, its name was changed once again. After the 1979 Islamic Revolution in Iran, the names associated with the Shah regime were changed and the historical name of Lake Urmia was restored.

Although the Islamic Revolution overthrew the anti-Turkic Pahlavi regime, the lake faced a new tragedy - the hazard of drying up. This hazard occurred around the lake can pose a threat to more Azerbaijanis. However, the population of the region consists mostly of Azerbaijanis. Shrinking of the lake will soon cause an ecological disaster in this region. Such a tragic situation can lead to the forced migration of Azerbaijanis from the areas around the lake. This process can also give rise to a new refugee crisis on the border with neighboring countries, especially Azerbaijan and Turkiye.

Why Is Lake Urmia Drying Up?

As we know, the ongoing climate change in the world is observed with the drying up of a number of water sources, including rivers and lakes. The complete drying up of water sources can endanger not only the agriculture and the ecosystem, but also life as a whole. In some cases, lakes dry up under the natural factors. However, the events happened in recent years show that the facts that lead to the drying up of lakes are the destruction of greenery, the construction of dams on rivers for the purpose of irrigation, and the overexploitation of underground water resources. If this process becomes rapid and serious measures are not taken, an ecological crisis may occur all over the world. One of these environmental disasters and the most dangerous one is the Lake Urmia crisis. In recent decades, the total area of the lake has shrunk by around 90%.⁴ Figure 1 indicates the process of water decline in the Lake Urmia basin.

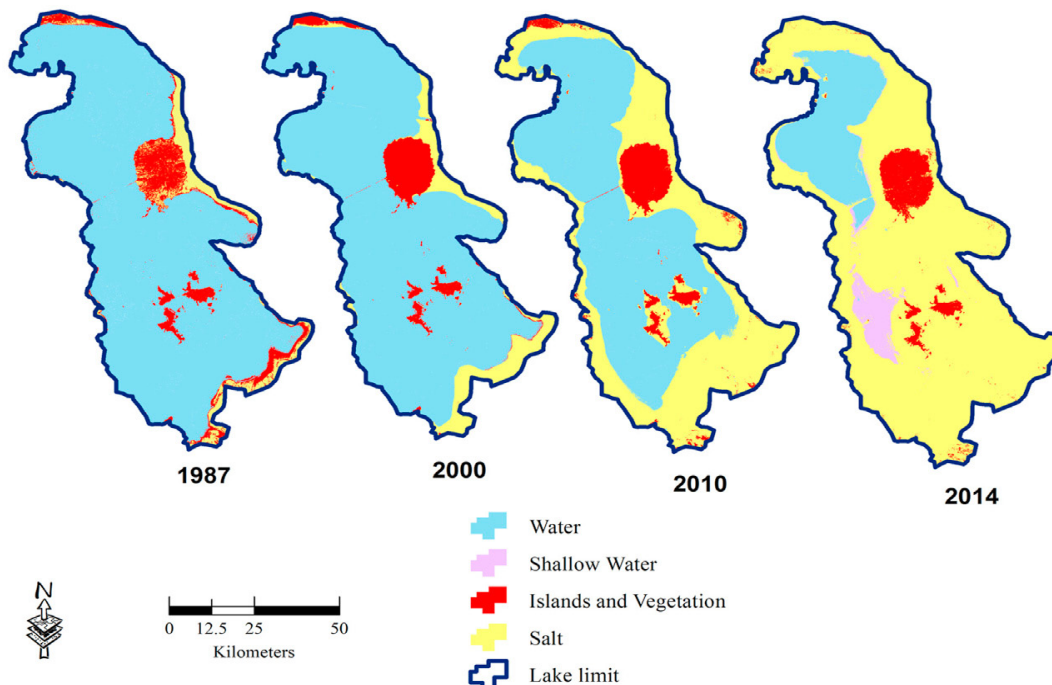


Figure 1 Decline of the Water Level in Lake Urmia from 1987 to 2014 (still not changed).

Source: Rahimi, A. & Breuste, J., Why is Lake Urmia Drying up? Prognostic Modeling with Land-Use Data and Artificial Neural Network. *Frontiers in Environmental Science*, 9, 2021, p. 5.

In 1995-2011, the water level in the lake decreased to about 7 meters.⁵ Natural factors can be found in the drying up of Lake Urmia. However, the conducted studies show that the drying up of Lake Urmia is more related to artificial factors. Isa Kalantari, the former secretary of the working group on the restoration of Lake Urmia, admitted that climate change accounted for 18% of the drying up of the lake, and human factors accounted for 82%.⁶

The reasons that affected the drying of the lake can be grouped as follows:

1. Natural or Meteorological factors:

Natural or meteorological factors have a negative impact on the current ecological crisis in Lake Urmia. Global warming is known to cause environmental problems all over the world, especially water scarcity. Thus, as a result of meteorological changes, the amount of annual precipitation in East and West Azerbaijan provinces, where Lake Urmia is located, has decreased and currently amounts to 341 mm³. At the same time, a sharp increase in air temperature has caused climate change in the Lake Urmia basin. Even during the dry summer months, the maximum air temperature can rise up to 40°C.⁷ This case affects to decrease water level in the lake. However, natural factors cannot be the only reason for the decrease of the water level in the Lake Urmia basin. However, drying of a lake occurs gradually and covers a long period under natural factors. Therefore, it is not correct to accept natural factors as the main and only reason affecting the drying up of Lake Urmia.

2. Dam construction in Watersheds:

One of the main factors leading to the drying up of Lake Urmia is the construction of dams on the rivers flowing into the lake.⁸ Thus, approximately 80% of the water entering the lake coincides with the winter and spring months. Weakening of river flows to the lake is observed with a further decrease of the water level, especially during the dry summer months. Before the environmental disaster, a large number of rivers flowed into Lake Urmia. Among them, the names of Nazlichay, Acichay, Sufichay, Galachay, Leylanchay and others can be listed. Each of these rivers played a very important role in maintaining the water level in the lake. The conducted studies indicate that approximately 48 dams were built on the main rivers flowing into the Lake Urmia basin for irrigation purposes until 2012.⁹ Currently, the number of dams is much more. These dams drastically reduced the amount of water entering the lake, which in turn contributed to the worsening of the environmental disaster in the Lake Urmia basin. It is possible to see the most important dams which are in operation, under construction and study in the Lake Urmia Basin from Figure 2.



Figure 2 Map of the Dams in Lake Urmia Basin.

Source: Hassanzadeh, E., Zarghami, M. & Hasanzadeh, Y., Determining the Main Factors in Declining the Urmia Lake Level by Using System Dynamics Modeling. *Water Resources Management*, 26(1), 2011, p. 134. <https://link.springer.com/article/10.1007/s11269-011-9909-8>.

3. Poor or Bad Agricultural Management

Poor agricultural management is one of the key reasons for the drying up of Lake Urmia basin. The population of the region is mainly engaged in agriculture that increases the demand for water. For this purpose, the cultivated areas in the Lake Urmia basin were increased from 350,000 hectares to 500,000 in the years 1987-2014.¹⁰ However, the predominance of sugarcane, apples and other products that require more water in agriculture has led to more exploitation of water resources. As a result, a significant part of the rivers entering the lake perishes without entering the lake. Unfortunately, people's water need is not covered only by dams built on rivers, but also wells are dug for irrigation. According to the obtained information, there are approximately 88,000 wells around Lake Urmia.¹¹ Thus, excessive exploitation of renewable water sources gives rise to a decrease of water entering the lake. This process results in sharp increase in the level of salinity in the Lake Urmia basin and accelerate environmental crisis.

4. Bridge Construction over the lake

One of the reasons for the drying up of Lake Urmia, and the most important, was the construction of a 14 km long bridge across the lake in 1979 with the objective of minimizing the road distance between the cities of Tabriz and Urmia, which are the administrative centers of East and West Azerbaijan provinces.¹² The construction of the bridge took several years, and finally was accessible to the general public in 2008. Through the bridge, the commute of the residents became much easier and time wastage was reduced to a minimum. However, the construction of the bridge was not done with

modern technology, but with an elementary method. So, the piers of the bridge were filled by pouring soil into the lake. The dumping of large amounts of soil into the lake blocked the flow of water and evaporation gradually increased.¹³ As a result of the poor bridge construction, the ongoing crisis in Lake Urmia has accelerated.

Thus, the human and artificial factors listed above show once again how real the danger of desiccation of Lake Urmia is. This process may occur about several decades. Both the scale of the environmental disaster and the socio-economic consequences may grow, if serious measures are not taken.

Negative Impacts and Socio-Economic Consequences of the Lake Crisis

It is known that if Lake Urmia dries up, a large amount of salt flat can be exposed. In turn, this may cause dust and salt storms in the region, completely destroying vegetation, flora and fauna.¹⁴ If this process becomes very rapid, a sharp increase in salt storms will be observed. This will lead to the spread of a number of infectious diseases. The environmental disaster initially threatens the life and health of the local population living around the lake. Even in 2014, in order to investigate the impact of salt and dust storms on the health of preschool children, the Iranian government conducted a test on 88 students in East Azerbaijani province, and it was found that they had a number of diseases.¹⁵ If serious measures are not taken to prevent the drying of the lake, its negative consequences will continue to grow. The scale of the disaster will cover not only the provinces of East Azerbaijan and West Azerbaijan, but also other provinces of Iran, neighboring countries such as Azerbaijan, Turkiye and Iraq.

The socio-economic consequences of an ecological disaster are not little. So, the population of the region is mainly engaged in agriculture. The gradual drying of the lake will bring about the salinization of usable land areas. This causes to both the destruction of the economy and the reduction of jobs. Paralyzing life and activity in the area around the lake by an ecological disaster will lead to forced migration of people from the region.¹⁶ Even Esmail Kahrom, a professor of environmental sciences at Tehran University, made a very dangerous prediction. According to E. Kahrom, “*The crisis in the Lake Urmia basin will soon lead to salt hurricanes, which can spread up to 500 km away, completely destroy several cities and cause the forced migration of millions of people*”.¹⁷ As can be seen in the Figure 3, dust and salt storms as a serious threat to Middle East and South Caucasus regions are still active.



Figure 3 *Radius of 500 km from the Lake Urmia.*

Source: Garousi, Vahid, Najafi, Aref, Samadi, Azar & Rasouli, Kabir, Environmental Crisis in Lake Urmia, Iran: A Systematic Review of Causes, Negative Consequences and Possible Solutions. *Proceedings of the 6th International Perspective on Water Resources and the Environment (IPWE)*, 2013, p. 5.

The environmental disaster in the Lake Urmia Basin may bring other dangers along with it. The issue of migration is the most worrying among them. There is no coincidence that migration brings additional challenges and causes a refugee crisis in a country of destination. The first steps of migration showed itself on the islands located in the Lake Urmia Basin. So, there were more than a hundred islands in the lake before the crisis. There was even a life on Shahi and Goyundag islands. However, many of these islands merged with the land surface after the water level dropped and became uninhabitable. This led to the forced migration of residents. If the scale of the disaster increases, migration flows may be directed not only to the central provinces of Iran, but also to neighboring countries, mainly Azerbaijan and Turkiye. Iran's official circles also acknowledge the serious negative consequences of the environmental disaster. Isa Kalantari, Chairman of the Environmental Protection and Ecology Organization of Iran, predicted that in the next 25 years, the eastern and southern provinces of the country will be empty due to migration, and if the water crisis problem is not solved, the existence of the country called Iran will be questioned.¹⁸ As it can be seen, the crisis in the Lake Urmia basin can engender to serious negative consequences. Therefore, preventing the drying up of Lake Urmia is very necessary to ensure stability in the region.

Initiatives for the Restoration of Lake Urmia

Although the economic stagnation that began during the Pahlavi period in the provinces where Azerbaijanis live compactly was eliminated by the Islamic regime, the threat of drying up of Lake Urmia has led to environmental problems in the area around the lake. Looming disaster worried the local residents of the region, Azerbaijanis. However, the indifferent attitude of the Iranian authorities to this issue caused people's rightful protests. The environmental problem in the Lake Urmia basin has given a new impetus to the national movement in South Azerbaijan by April 2010. The protests in Tabriz, Urmia, Ardabil, Maragha, Marand, Sulduz, Goshachay and other cities continued at different times for two years. Thousands of Azerbaijani protesters gathered on the bridge built on Lake Urmia, condemned the lake crisis and required to take serious measures by the government. The protesters demanded that the government respect the rights of Azerbaijanis and resolve the lake crisis.¹⁹ Although the protests were quelled by the government's use of force, it contributed to restoration initiatives among Iran's ruling circles.

The crisis that has arisen around Lake Urmia primarily worries Azerbaijanis, who are the native population of the region (the provinces of East Azerbaijan and West Azerbaijan). However, the intensifying of the crisis may jeopardize the presence of Azerbaijanis in the region. At the same time, the consequences of the ecological disaster may cause great damage to Iran's economy, which has a water problem. Therefore, the solution of the lake crisis is also in the focus of Iranian ruling circles. Thus, in order to prevent the lake from drying up, the Urmia Lake Restoration Program was created in 2013 and a number of initiatives were put forward.

- i. One of such initiatives was to import water into the lake from the dams built on the rivers flowing into Lake Urmia.²⁰ As mentioned above, until 2012, about 48 dams were built on the rivers flowing into the lake, and a very large part of the water resources collected here is used in agriculture. These items, which are constantly increasing in number, do not allow us to hope that the proposed initiative will be realized.
- ii. Agriculture is the main occupation of people in the provinces of East and West Azerbaijan where the lake is located. The development of agriculture in the region increases the demand for water. According to the Urmia Lake Restoration Program, one of the best solutions for creating an ecological balance in the lake is to reduce the volume of water used in agriculture by 40%.²¹ However, this initiative is not strictly followed and renewable water sources continue to be consumed mostly on farms.
- iii. One of the initiatives put forward as a last remedy for the restoration of Lake Urmia was to import water from other rivers into the lake. One of the first steps taken in this issue was the project of building a dam on the Araz River on the Iran-Azerbaijani border and draining the water into Lake Urmia.²² The implementation of this initiative requires huge financial resources, and for the Iranian authorities, which are confronting sustainable economic sanctions, it does not seem realistic to carry out this project. This initiative, which was set during the visit of former Iranian President M. Ahmadinejad to Tabriz in 2010, was concluded with such words and no attempts was made to implement it. Even in 2015, the former president of Iran, Hassan Rouhani, during his visit to the province of West Azerbaijan, promised the native population that the Lake Urmia would be restored. However, the promises were in vain.

Undoubtedly, the initiatives taken for the restoration of Lake Urmia did not come to an end there, calls for the elimination of the ecological crisis continued in series. However, no serious efforts are made to implement the proposed initiatives and false promises are given to the people. Preventing the drying up of Lake Urmia is the main issue for the international organizations. For this purpose, the United Nations Food and Agriculture Organization (FAO), the United Nations Development Program (UNDP) and the Japanese government also provided financial assistance to the Iranian government. Unfortunately, the Iranian government has taken no strict standards to prevent the lake from disappearing.²³ Thus, neither the international support nor the “supposedly” implemented measures by the government have yielded results and the danger in the Lake Urmia basin still continues. The Aral Sea syndrome* may be repeated in the Lake Urmia, if serious measures are not taken soon.²⁴ Such a catastrophic situation is an alarm signal not only for Iran but also the whole region. As a result, the crisis in the Lake Urmia Basin should be kept on the top agenda by the relevant regional and international organizations.

Conclusion

As can be seen, the water level has been declining due to artificial factors, which has stopped the flow of fresh water to the lake since the late 1990s. This process started during the presidency of Rafsanjani and caused an environmental disaster in the region until 2010. At the same time, the Iranian government’s wrong bridge construction over the lake accelerated decreasing the water level in the Lake Urmia Basin. The water dams built on the rivers flowing into the lake, the overexploitation of underground water resources in agriculture and other artificial factors lead to the assumption that the lake will dry up completely in the coming years. At the same time, the measures implemented by the government did not give positive results. Hence, the first question people think about the lake crisis is: “what happens if the Lake Urmia dry up completely?!” The socio-economic consequences

that an environmental disaster can cause are very riskful as much as diverse. Not only Iran, but also the neighboring countries and the whole Middle East region will face a great environmental disaster if the lake is not protected.

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Notes

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