THIRSTY BORDERS: IRAN'S WATER CRISIS AND SECURITY CHALLENGES WITH ITS NEIGHBORS

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Introduction

Arid Iran is grappling with a severe water crisis, impacting its security and neighborly relations. This paper explores the roots of the crisis, including climate change, poor water management, population growth and agricultural practices and highlights the potential security challenges it poses to Iran's relations with its neighboring countries. The scarcity crisis extends beyond Iran's borders, with shared water resources leading to transboundary disputes and potential diplomatic tensions with neighboring countries. Collaborative regional efforts are crucial for alleviating tensions and fostering sustainable water management practices, thus mitigating the risk of water-related conflicts. Furthermore, the paper examines how the water crisis might influence Iran's foreign policy decisions and alliances in the region. Non-state actors could exploit water vulnerabilities for political gains, heightening the importance of understanding the crisis' implications for regional stability. In Iran, a serious water crisis has been a consequence of a combination of climate change and poor water management practices. Dams built for agriculture and hydropower

have compounded the problem, leading to the depletion of significant rivers, lakes and groundwater levels. Wide-ranging implications of this crisis pose dangers to both Iranian and global security. Millions of people have been displaced due to water stress, which has resulted in unstable drinking water supplies, lost livelihoods and social instability across Iran. Additionally, the water issue in Iran has strained ties with nearby governments like Iraq and Afghanistan since reduced water flows in these countries have exacerbated water crises there, potentially escalating hostilities. Adapting to climate change, managing water resources sustainably and fostering regional collaboration are all necessary to address the urgent situation.[1]

Iran's national security includes the protection of its water resources. Climate change and a lack of water supplies have made border regions less secure. Accurate geopolitical perspectives and coordination with neighboring countries are necessary for managing shared water resources. Establishing regional agreements and achieving regional convergence is key to tackling this issue properly. Economic prosperity and increased international clout can be a consequence of effective water resource policymaking. The political, economic, social and environmental issues in this region must be taken into consideration to accomplish the aforesaid. Iran has the second-highest concentration of neighbors in the world, behind only Russia, along its sea and land boundaries. About 22% of Iran's borders, or 1,918 kilometers, are created by rivers. The Aras, Tigris, Euphrates, Sarisu and Karasu are the five rivers that Iran shares both directly and indirectly with Turkey in its western region. When it comes to the Aras, Tigris and Euphrates rivers, Iran is regarded as a downstream country. Water resources are one of the most important environmental aspects that influence relations between Iran and Turkey because they are two powerful countries in the West Asia region. The location of both countries in the dry and semi-dry region of the planet increases the significance of the issue and creates difficulties between them. Dust storms are one of the inescapable effects of Turkey's numerous development projects, which include building dams on the Tigris and Euphrates rivers, causing significant environmental harm both inside Turkey and in neighboring countries like Iran.[2]

Iran ranks 14th out of 116 countries in terms of its water crisis, highlighting the challenging state of its water resources. The country currently faces periodic water tensions, which are expected to become permanent as the population continues to grow. Over the years, Iran's renewable water per capita has declined significantly, dropping from 5,500 cubic meters per capita to less than 2,100 cubic meters between 1961 and 1976, and further decreasing to 1,750 cubic meters in 2001. By 2006, with a population of around 70 million people, the renewable water per capita had reduced

to approximately 1,670 cubic meters per year.[3] Iran is recognized as one of the most vulnerable countries in the region with the highest water stress in the world. In absolute terms, Iran has a large population and more economic production in a region with a high-water harvest than in other Middle Eastern and North African countries. More than 90% of Iran's population and gross domestic product (GDP) are in areas where water consumption is approaching unsustainable consumption levels. Water productivity in Iran is low and a significant share of water is consumed in agriculture, and the economic returns of agricultural water in the country are among the lowest in the region.[4]

Since the beginning of the 21st century, Iran has experienced extended drying, which is manifested in the disappearance of lakes and wetlands and widespread water stress. Such episodes of drought, which are examples of "anthropogenic droughts" — water stress brought on or exacerbated by aggressive, opportunistic and unsustainable land and water management — are human-induced, as previously illustrated by the reduced surface water availability in Iran.[5]

Food and Water: Crucial Challenges to Iran's National Security

Chairman of the Iranian Chamber of Commerce Gholamhossein Shafei designated food security as an important economic issue while the water crisis is the most significant challenge facing the country. The water challenge is considered a great danger to Iran's economy. Referring to reports of international organizations, especially the United Nations, regarding the water crisis in Iran, Shafei said, "The United Nations report shows that if Iran continues in the same way in the next 20 years, the idea of a living creature in this country is far from expected." Iran has 10 years to prevent this scenario.[6] Important challenges that the water crisis can cause the Iranian government to face in the future include forced migration and population change in some provinces. Forced migration will disrupt the demographic composition of some Iranian provinces. According to one official, the phenomenon of "land subsidence," caused by improper withdrawal of water and discharge of groundwater aquifers, will result in the forced migration of more than 37 million people to the west and north of Iran. With the concentration of facilities in metropolitan areas, preparations have been made for the uncontrolled increase of population in these areas.[7]

Due to the concentration of industries and factories that consume a lot of water in the central provinces of Iran, where most of the population is Persian, several metropolises in these provinces are seriously prone to water crises; Tehran, Mashhad, Isfahan and Kerman are in a more dangerous situation than other cities and Shiraz is also moving in this dangerous di-

rection, intensifying the underdevelopment cycle in the country. The context of this dangerous underdevelopment cycle is that, on the one hand, water intensive-industries such as power plants, petrochemicals, steel and cement are located in the arid geography of the central plateau, which faces a scarcity of water resources and empty aquifers. On the other hand, the major products of these industries are used for two main consumer sectors, namely housing and automobiles.[8] Referring to the water crisis in northwestern Iran, Majid Asanlu, the representative of Zanjan in the Supreme Council of Provinces, said that Iranian officials have not yet come to the conclusion that Iran is suffering from a water crisis, and when the water runs out and there is not even a drop left, maybe some of the officials will wake up and see that there is a crisis in the country.[9]

In 2012, Iran had 316 dams, and by 2018 this number had risen to 647. In 2019, with the aim of directing water to drought-hit cities, Tehran announced a two-year plan to establish a further 109 dams. By 2020 the Sirvan region had a total of 18 dams. Arif Keskin, a Turkish researcher specializing in Iran, stated that the water crisis is a foundation of many problems between Iran and Turkey, including the unsanctioned movement of Afghan refugees into Turkey with Iran's assistance. Keskin told Al-Monitor that "Iranian officials try to portray Turkey's dam projects as the main reason of drought not only in Iran but also in Iraq and Syria." Thus, Iran feels that the actions of Ankara impact its national security directly.[10]

Centralism, a Key Factor in the Iranian Water Crisis

Having more than 9,000 industrial units and the largest factories such as Foolad Mobarakeh and Zobahan, Isfahan is in first place among Iran's industrial provinces. However, the establishment of water industries despite water shortages and without considering the necessary criteria in a radius of 50 kilometers east, west, south and north of the city center of Isfahan has contributed to depleting the water reserves of the Zayanderud dam in recent years. Hence, the establishment of major water intensive-industries such as steel, iron and others has become one of the major concerns of water authorities in the country and the province.[11]

As claimed by Mohammad Nazemosadat, a member of the Agriculture Faculty of Shiraz University, the population of Iran has multiplied over the past 100 years, so if the amount of water is at least the same as before, it can be concluded that the pressure on water resources has increased over a period of 100 years. There have been no noticeable changes in rainfall, but we have seen an increase in the demand for water resources because of poor management practices and population growth. Against this backdrop, the Iranian populace has faced a great challenge. [12] Simultaneous

sanctions, and the lack of water and natural resources will increase the country's dependence on the import of crops and livestock and imported agricultural goods (including livestock and poultry feed).

Like other arid regions, Iran must begin regenerating water as a step in its ecological diplomacy. In doing so, Tehran will be able to work on climate adaptation, international security and ecological regeneration. Ecological services, namely pollination, health regulation, potable water and disaster buffering all depend on sustained water supplies. A lack of water will not only impact the environment but also socioeconomic and political stability. If Iran loses such stability, we will likely witness international, regional and domestic aggression from Tehran. Managing water security in the country is a necessary initial step in overcoming systematic instability within Iran's borders. The factors that have led to the depletion of water resources include: a failed policy of agricultural self-sufficiency along with neglect of available water and export development of agricultural products with high water needs, water-based employment, population growth plans, deployment of people in water-scarce areas and expansion of metropolises, unsuitable locations for water industries, poor water consumption patterns, neglect of water loss in the distribution network, existence of inadequate environmental and sustainable development laws/policies and lack of a water market. Iran must consider various options for water import, transfer between watersheds, desalination of seawater and its transfer to the central plateau of the country.[13]

According to the Iranian Parliament's Research Center, it is only 20 years away from reaching the brink of water poverty. The report of the Research Center shows that water per capita in Iran will reach 976 cubic meters in 2040, based on a population of 106 million. This means that water will be rationed, and Iranians will no longer be able to drink a glass of clean water by opening the tap. According to international standards, when water per capita in any country reaches below 1,000 cubic meters, it signals a water crisis in that country. According to the report of the Research Center, due to climate change, Iran's water resources will face a drop of 300 cubic meters in 2040 bringing it to 976 cubic meters per capita from the current level of 1,200 cubic meters.[14] The demand for water resources has greatly increased because of Iran's rapidly expanding industrial activity. Agriculture, industry and mining are just a few industries that depend heavily on water. The problem of water shortage gets worse as the industrial sector grows because more water is being taken from water sources that are already scarce. The available water supply is further stressed by industries' poor water consumption methods.

Urgent resource management issues arise from Iran's switch to electric energy for agriculture and the country's diminishing groundwater supplies. Without providing incentives for water conservation, the continuance of significantly subsidized electricity for agriculture is predicted to worsen the cost imbalance. In parallel, it is expected that groundwater levels will keep falling, raising short to medium-term energy requirements for agricultural and government subsidies. This can put pressure on the electric power sector and result in increased greenhouse gas emissions. It is crucial to recognize depleting groundwater levels as a warning indication. To reduce long-term socioeconomic effects, including job losses resulting from the depletion of high or marginal-quality groundwater, adaptive agricultural water management strategies must be put into place.[15]

The Impact of Climate Change on Water Scarcity in Iran

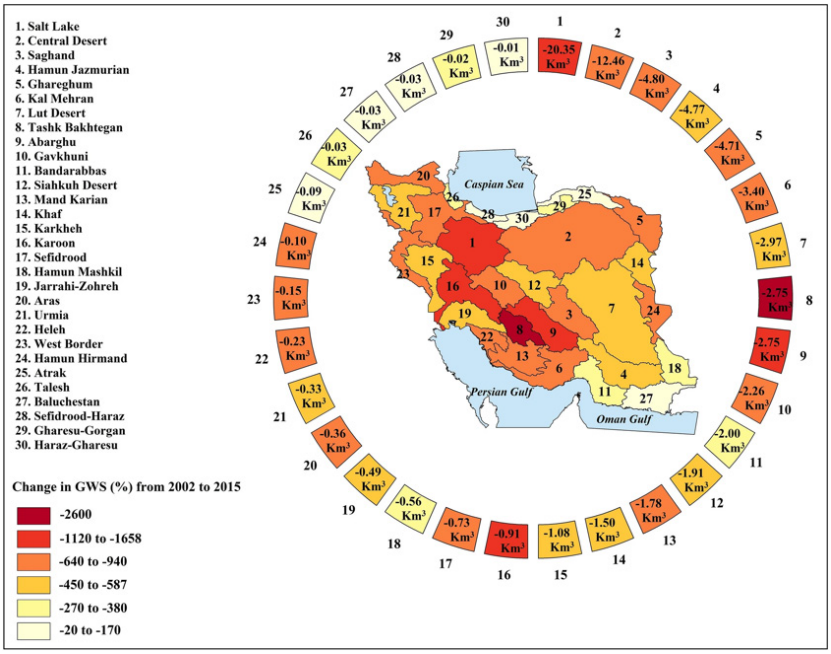
There have been some studies on how Iran's water situation is related to climate change. One of these studies predicts that climate change would significantly reduce Iran's water resources, including precipitation, accessible water, renewable water and groundwater, increasing the water shortage. Iran's climatic zones are all affected differently by climate change, with desert regions being particularly hard hit. To prevent environmental and socioeconomic problems, conflicts like those witnessed in African countries and complicated trade-offs in water distribution across sectors, urgent strategies are required to resolve the approaching water issue, particularly in dry regions. The vulnerability of individuals who depend on natural resources for their livelihoods rises due to the intensified effects of climate change on Iran's environmental water resources. To manage these trade-offs and address geographical disparities in water scarcity, the government should prioritize regional development based on natural capabilities.[16]

Another research demonstrates the complexity of Iran's water difficulties, which are caused by both natural phenomena like climate change and droughts as well as man-made problems including ineffective administration, disorganized planning and misplaced development goals. Due to the socioeconomic drought that has resulted, there is a severe water shortage since demand considerably outweighs supply. Iran continues to invest in pricey structural solutions like water transport and desalination projects, despite their negative environmental and economic effects, rather than placing a priority on water conservation. Iran must shift from a "nature control" mentality to "nature management" and lessen its reliance on expensive technology fixes in order to successfully handle these issues.[17]

Reduced precipitation, more heat and higher evaporation rates are all effects of the area's ongoing temperature rise and relative warming. The

city of Mashhad has noticeably continued its warming trend. Indicators of maximum temperatures, such as hot days, tropical nights, dry spells and heatwaves are increasing as temperatures rise. Due to the city's increased demand for cooling during the summer, there has been a rise in pollution and the use of fossil fuels. On the other hand, based on daily minimum temperatures, cold days with frost and heatwaves have decreased.[18]

Figure 1: Anthropogenic Drought Dominates Groundwater Depletion in Iran



Source: Samaneh Ashraf, Ali Nazemi , Amir AghaKouchak, "Anthropogenic Drought Dominates Groundwater Depletion in Iran," *Sci Rep* 11, no. 9135 (April 2021).

Groundwater depletion (in km3) in Iran's key basins between 2002 and 2015. Basins are arranged from greatest to smallest in the outer circle according to the total amount of groundwater storage that has been depleted in km3. Groundwater storage in percent was changed relative to baseline over the research period and is depicted in this figure using ArcGIS 10.8.[19] Recent climate change research shows that severe precipitation events are becoming more frequent and intense across many worldwide locations. In addition to struggling with severe climatic and human-caused droughts, Iran has also witnessed disastrous floods, including those in 2019 and 2022. Understanding the direction of change is still difficult because of

the intricate interactions between the various elements affecting flood frequency and size. To prevent future flash floods in Iran, it is imperative to reevaluate and regionalize the link between precipitation patterns and these floods. While previous studies have looked at long-term precipitation changes in various areas, little attention has been given to the relationship between trends in flood frequency and amplitude and severe precipitation events.[20]

Water Transfer Projects

Since a comprehensive plan to resolve the water crisis has not been prepared by the Iranian government, the priority of governments in recent years has been to transfer water from the Arabian Gulf-Caspian Sea and from some border provinces of Iran to central provinces. The idea of transferring water from the Arabian Gulf to central Iran was raised after the revolution during the presidency of Hashemi Rafsanjani. But for the first time, Mahmoud Ahmadinejad made an official announcement in 2012: "It has been concluded that this issue has started in the provinces of Kerman and Yazd, and we are looking for its implementation in Isfahan as well. Despite the government's insistence on implementing water transfer projects, some experts believe that the amount of water transferred in the form of these projects is not commensurate with the amount of water required in residential, industrial and agricultural areas. By spending less than these costs, other solutions can be found to resolve the water crisis."[21]

The Arabian Gulf Water Transfer Project

Some Iranian media outlets call this project a "super project," considering it the longest water transmission line from the Arabian Gulf to Sirjan in Kerman Province. The length of the line will extend for more than 800 kilometers in three stages in the three provinces of Hormozgan, Kerman and Yazd, but "17 provinces" will benefit from it. The executor of the project is WASCO with the investment and shareholding of Golgohar Mining and Industrial Companies and Chador-e-Mello and National Iranian Copper Industries. [22]

The Oman Sea Water Transfer Project to Mashhad

One of the heaviest desalination and water transfer projects in the country was proposed on the last day of February 2016 in the form of a contract for water supply and transfer from the Sea of Oman to the eastern provinces of the country (Sistan and Balochistan, South Khorasan, Razavi Khorasan). Much was invested in the private sector, but it was eventually decided that 75% of the funding would come from the National Development Fund, with only 25% of the project cost going to the private sector.[23] The water

transfer project would start from Hormozgan Province and be transferred to Razavi Khorasan via Kerman and South Khorasan. This could help in the development of greenhouse industries and large industrial and mining units in these provinces. The important point is that the water extracted in this project would be cheaper when compared to that in the Arabian Gulf countries, including Oman and the UAE. The first line transports water from the Arabian Gulf to the provinces of Hormozgan, Kerman and Yazd, and its employment potential is estimated at 16,000 during the construction phase. In the second line, Arabian Gulf water would be transferred to the provinces of Kerman, South Khorasan and Razavi Khorasan. In the third line, the water of the Arabian Gulf would be transferred to the provinces of Yazd and Isfahan. In the fourth line, the transfer of water from the Sea of Oman to Sistan and Balochistan Province is predicted. This project will stretch over 820 kilometers with 11 water pumping stations. [24]A water transfer project is faster than a national one, which takes years to implement and consolidate; yet a national water supply has more lasting results.[25] Water is a regional issue because it is directly related to regional security. Although the issue is fundamentally technical in nature, its politicization complicates the matter.[26]

Iran's Water Disputes With Its Neighbors

Iran's water crisis and regional stability are greatly impacted by disputes over water resources with its neighbors, particularly Turkey, Afghanistan and Iraq. These disputes center on shared river basins, which are important for supplying water to numerous countries and have the potential to cause friction and violence. For regional peace and sustained growth, Iran's disputes with its neighbors over water must be resolved. Finding equitable solutions is crucial to ensure fair water distribution and prevent tensions from growing into more serious geopolitical issues. Iran and its neighbors may turn disputes over water into opportunities for cooperation by encouraging open communication, diplomatic engagement and regional cooperation.

Iran-Iraq Water Dispute

Significant water shortages in Iran are not only having domestic ramifications but also impacting relations with Iraq. The scarcity has worsened due to improper management of water resources, including massive dam construction and water transfers. As a result of the rapid water flows into Iraq, the western Iranian regions that border that country are currently suffering from severe water shortages. Iran's government has chosen short-term fixes over long-term solutions, failing to develop a

comprehensive water management plan. This has caused tensions among farmers in various regions as they struggle to secure water supplies. Concerns regarding Iran's water foreign policy and its capacity to address the crisis are raised by the absence of suitable legislation and agreements to manage shared water resources with neighboring countries. Concerns are raised by the fact that Iran has a "water mafia" that uses water resources to gain political clout and money. Iran's environmental problems are exacerbated by frequent sandstorms from Iraq, which highlights the urgency of taking urgent action to prevent potential water-related disputes and ensure the sustainable use of water resources in the area. [27]

Iran and Iraq share the Mesopotamia (Euphrates-Tigris) catchment area. Despite the many common water resources that exist along the long borders of the two countries, the main differences throughout history have been related to the southern borders and the Arvand River. The main reason for Iraq's interest in having a larger share of the Arvand River and later in the invasion of the Khuzestan Province could be its short border with the Arabian Gulf. Former Iraqi leader Saddam Hussein's emphasis on Arab ethnicity in the Khuzestan Province was merely an excuse for greater access to the Arabian Gulf. However, despite several agreements signed between the two countries on the rights of Iran and Iraq regarding the Arvand River, differences remain between the two countries in this regard. [28]

For its domestic consumption and agriculture, Iraq primarily depends on the flow of water from upstream countries, notably Iran. Iraq's water security and agricultural output are impacted by Iran's water policies as well as upstream dam developments. In order to maintain equitable water distribution and prevent future conflicts, managing the water resources in this shared basin requires cooperation and communication between Iran and Iraq.

It is claimed that Iran's behavior in using the water of the border rivers is in accordance with international law and has neither reduced the amount of water entering Iraq in any way nor caused any damage to this country. At present, and by 2009, the commission provided in Article 3 of the Agreement on the Use of Border River Water has been set up to determine the share of each of the two countries in the water of these rivers. Given that bilateral water agreements between Iran and Iraq are settled and signed, the settlement of disputes between the two sides is possible only through negotiations and bilateral agreements. Naturally, the general principles of international law on water can be the legal basis for negotiations.[29]

Regarding Iran's non-cooperation with Iraq over water resources in September 2023, Iraqi Minister of Water Resources Mehdi Rashid al-Hamdani stressed that the country had not reached any agreement with

Iran on the share of Iraqi water. "We have evidence that Iran is digging tunnels and diverting water," Hamdani said, referring to the dispute over water with Iran. He added, "We have officially informed Iran of the violation of these laws, but we have not received any response from Iran."[30]
Iran's management of water affairs in recent years has had a negative impact on Iraqi agriculture, and it is causing water shortage problems in the country. Dam construction also disrupts normal life and causes people to react. [31] In December 2022, as Iraq's water crisis continued and concerns heightened over the drying up of most of the country's rivers and wetlands, Baghdad announced that it would soon send a technical delegation to Tehran to negotiate with Iran the release of water from the Hoveyzeh Wetland. Iran and Iraq are facing upcoming dust storms, meaning that transboundary water management is critical for both sides. However, it is not possible to predict any outcomes from these efforts at this juncture. While it is hoped that the root cause of the problem can be tackled, this will require the inclusion of Syria and Iraq in discussions. To reach this point, Tehran and Ankara must take a pragmatic path and avoid dependence on rhetoric. However, pragmatism is limited as both Ankara and Tehran depend on populist politics to appeal to nationalist emotions to distract populaces from economic crises. [32]

Iran-Afghanistan Water Dispute

The dispute between Iran and Afghanistan over the division of the Helmand River has remained unresolved for more than six decades. A satellite image that Spiegel Online was provided with by the private company Planet clearly shows that the Helmand River behind the Kamal Khan Dam in southeastern Afghanistan has been flooded for hundreds of kilometers. In recent years, Afghanistan has blocked the flow of water to the Hamun Lake by creating numerous dams and blocking earth dams on the Helmand River, causing drought in parts of Iran; for this reason, Iran should consider providing alternative water sources for the development of Sistan and Balochistan Province. Common border rivers and how to exploit transnational water resources, on the one hand, can be a point of contention and conflict over the guarantee of maximum unilateral interests, and on the other hand, can be the beginning of dialogue and cooperation for sustainable development in Afghanistan and eastern Iran. From a realistic perspective, Iran can use its leverage to force the Afghan government to fulfill its obligations. On the other hand, the two countries can continue their dialogue for years within the framework of a legal and political approach, however, both will lose the opportunity for economic development without much tangible and practical results. [33]

When the Kamal Khan Dam was inaugurated in March 2021, then Afghan President Mohammad Ashraf Ghani announced that the province of Nimroz would become a water reservoir for Afghanistan and Iran. "Afghanistan's water will now be sent to Iran in exchange for oil," he said Ghani announced at the opening of the dam that Nimroz Province would become a water reservoir for Afghanistan and Iran. "Afghanistan's water will now be sent to Iran in exchange for oil," he said.[34] Afghanistan is claimed to believe that by controlling its outflows to Iran, it can control Iran's behavior and political decisions regarding the sale of cheap oil and the reception of migrants.[35] The water crisis has been exacerbated by internal corruption. For instance, Iran's largest wetland, the Hor al-Azim Wetland which borders Iraq, has suffered major damage. Despite the Department of Environment raising objections, plans by the Ministry of Petroleum to examine the region for oil, saw the 120,000-hectare wetland drained. Despite this, seeking to keep costs low, the Ministry of Petroleum sought and was granted permission from non-specialist higher bodies to drain the wetlands. The draining of this wetland led to the widely destructive flood in Khuzestan Province in March 2019.[36]

Recent Developments in the Iran-Afghanistan Water Dispute

The recent border conflict between Afghanistan and Iran has brought attention to the critical problem of water scarcity and tensions between the two countries. A dispute over the flow of water from Afghanistan's Helmand River into Iran led to border clashes. The Taliban regime in Afghanistan has been accused of deliberately depriving Iran of water, but it claims that a lack of rainfall and low river levels are to blame.

The water-scarce area of Iran runs the risk of becoming unstable, and current protests could worsen. Water scarcity makes the socioeconomic and political situation much worse considering that Iran is already facing a deep economic crisis, compounded by the tough US sanctions regime. Costly infrastructure expenditures as well as sustainable farming practices are necessary to help in mitigating the situation, however, both are difficult to proceed with given the existing financial restrictions and lack of adequate water management and agricultural policies. Cooperation, sustainable management, and diplomacy are essential to address the water crisis between the two countries. Upstream control gives the Taliban more power, which affects relations with Iran. Even while the situation is amenable to negotiation, it nonetheless poses a threat to regional cooperation and stability.[37]

Iran-Turkey Water Dispute

The Tigris-Euphrates River dispute between Iran and Turkey is one of the

major water conflicts. This important waterway, which rises in Turkey and flows into Iran and Iraq, is shared by these countries. Due to its control over the headwaters, Turkey can alter the direction of water flow, which has an impact on both Iranian and Iraqi water supplies. Concerns about water shortages and damaged ecosystems in Iran and Iraq have been expressed because of changes in water flow and dam development in Turkey. These concerns are made worse by the lack of a formal water-sharing agreement and regional collaboration mechanisms. Transboundary water resources, particularly the Aras and Tigris rivers, are the source of rising tensions between Turkey and Iran. Iran accuses Turkey of building dams that could damage both Iran and Iraq by decreasing water flows. However, Iran will find it difficult to file a lawsuit without Turkey's involvement in The Convention on the Law of Non-Navigational Uses of International Watercourses (UN Watercourses Convention-1997). Tensions continue despite efforts to gauge water flow and address the problem together, complicating the larger geopolitical issues between Turkey and Iran. Continued diplomatic efforts and collaboration are needed to resolve the conflict and ease the region's water crisis.[38]

Turkey's construction of dams on the Euphrates and Tigris rivers, which has raised concerns about Iran's water supply, is at the crux of the dispute between Turkey and Iran. Tehran claims that Ankara is diverting water to its detriment and is seeking diplomatic talks to resolve the situation. Turkey contends that Iran's water constraints are the product of poor management, not because of the construction of dams, which Ankara asserts have assisted in reducing water scarcity during dry spells and fostering bilateral relations. Iran's water policies are criticized by its neighbors, and Iraq plans to lodge a protest about Iran's water policies with the International Court of Justice. Iranian officials accuse Turkey of escalating regional instability and blame Turkey's dam projects for the droughts in Iran, Iraq and Syria. This has further strained relations between the two countries.[39]

A dispute over transboundary water management could erupt between Turkey and Iran. Droughts and dust storms in Syria and Iraq are attributed by Iran to Turkish dam construction, although Turkey disputes this and charges Iran with improper water resource management. The Southeast Anatolia Project and the Ilisu Dam are at the crux of the tensions and a multilateral solution is difficult given the competing interests of the four countries. Iran wants to strengthen its bilateral ties with Turkey and forge an alliance with Iraq and Syria. However, the aforesaid initiatives have the potential of creating a larger strategic rivalry between Turkey and Iran, further complicating the situation.[40]

The water problem in the coming years puts the interests of four countries at risk. Unlike the other three countries, Turkey has not signed the 1997 New York Convention on the Law of the Non-navigational Uses of International Watercourses, making the issue even more acute and providing no basis for a multilateral approach. Even if Ankara was bound by an international convention, it is not clear how successful Tehran could be in mobilizing support for its position given its isolation on the global stage.[41] It is imperative that all parties prioritize regional collaboration and water diplomacy to resolve the water problems successfully. Distribution of water resources more fairly and their sustainable use may result from the establishment of formal water-sharing agreements and cooperative management structures. To build mutual understanding and find a peaceful solution to the water-related problems, Iran, Turkey, Afghanistan and Iraq must participate in diplomatic engagement and transparent data sharing. To ensure water security and stability in the region, regional cooperation is essential. This cooperation will help in fostering a peaceful environment where shared water resources act as a basis for cooperation and development rather than as a cause of conflict and strain.

Lake Urmia Crisis: Iranian Water Politics, Ethnic Conflicts and Environmental Degradation

Due to the attention that successive Iranian governments devote to the central provinces, the issues of Lake Urmia drying up and the water crisis in Khuzestan Province have received less focus. There is a risk of re-drying. About 90% of Lake Urmia dried up before 2013. Although measures have been taken and there was a relative recovery after this date, the continual drought has slowed down this recovery process. In 2006, before drying up, it covered an area of 5,000 square kilometers, which in 2013 was reduced to 500 square kilometers, and the volume of water, which was 30 billion cubic meters, was reduced to 1 billion cubic meters. After the rehabilitation process, the volume of water increased from 1 billion cubic meters to 4 billion cubic meters and its area increased from 500 square kilometers to 3,666 square kilometers. Lake Urmia directly related to people's lives. If the lake dries up, life in the area will also dry up. According to the roadmap that was prepared, the desired natural balance of the environment will be achieved by 2027. The natural ecological level of the lake should reach an area of 4,400 square kilometers and its volume should reach 13 billion cubic meters of water.[42]

There is some academic research regarding the possible impact of the human factor and climate change on the lake's drying up. A study by Alizade and others shows that the lake and its basin are damaged more severely

by human factors than by climate change. It was assumed in former studies that the ground water from Lake Urmia was very small; however, the mentioned study reveals that the groundwater seepage from Lake Urmia cannot be neglected.[43] The most significant factors behind the shrinkage of the lake are drought and the rapid rise in agricultural activities. However, after 2014, there have been gradual improvements in climatic conditions. Moreover, the Iranian government has supplied the lake with more water. Changes in climatic conditions, agricultural development and population growth have all led to global environmental problems in recent years, particularly in countries like Iran where there are arid and semi-arid areas. Lake Urmia, which is one of the unique biosphere reserves in the world, has been impacted by the aforesaid in the last two decades.[44]

Khuzestan supplies 80% of the country's oil and gas for export and domestic consumption. The province has six customs borders, including the two important borders of Shalamcheh and Chazabeh. Why is Khuzestan important for the country? It is because experts believe that this province, with its 16 million tons of agricultural products, has a large share in the country's overall food supply. However, the great potential of this province has been neglected by successive Iranian governments. [45]

It should be acknowledged that agriculture cannot significantly affect the nation's economic growth and food supply if it uses a lot of water and produces little. Under these conditions, the government should grant funds for the import of agricultural items with high water requirements as well as the expansion of services and industries to promote economic development and conserve more water.[46]

Conclusion

Iran struggles with rising water shortages because of overpopulation and poor management in the social, economic and agricultural sectors. Iran is situated in dry and semi-arid regions with little rainfall. Conditions are becoming worse, especially in the southern regions, since neither the government nor society have taken the water situation seriously. It could be helpful to undertake further scientific analysis of the situation and learn from past global water management failures. Controlling urbanization, distributing the population fairly, boosting agricultural productivity, highlighting the value of water, fostering local cooperatives, involving farmers, boosting the industrial and service sectors and promoting widespread education on responsible water use are important measures for improvement.[47]

Regional cooperation and stability are significantly impacted by the water conflict between Iran and its neighbors, particularly Iraq and Af-

ghanistan. Shared water resources like the Tigris, Euphrates and Helmand rivers have been the subject of much discussion in the context of water allocation and management. Relations between these countries have been strained by disputes over water flows, dam development and water usage. Iraq's agricultural output and water availability have been impacted by the construction of dams in Iran, which has decreased water flows downstream. Existing tensions between the two countries have risen because of this. In addition, conflicting water demands and different approaches to water management have characterized the Helmand River dispute with Afghanistan. Iran and Afghanistan have suffered severely because of interruptions in the Helmand River's water flow, which has impacted agriculture, livelihoods and regional stability.

The water situation in Iran itself poses significant difficulties. There is a serious water shortage in many areas because of poor water resource management, excessive groundwater extraction and poor infrastructure. Khuzestan has had protracted droughts and water shortages. The Khuzestan problem has sparked demonstrations and instability, underscoring the critical need for efficient water management and infrastructural growth. Iran needs to give some important consideration to address its water crisis effectively. First and foremost, it is crucial to build strong frameworks for cooperation and water-sharing with neighboring countries. To ensure equal distribution and sustainable use of shared water resources, this calls for diplomatic negotiations, data sharing and collaborative decision-making processes.

Iran needs to alter its agricultural policies to find a lasting solution to its water crisis. It is advised to import agricultural items that require a lot of water to produce, such as wheat. Protests might be seen if the water crisis is not remedied soon. The water situation is being eased in Isfahan. To handle Iran's issues and disagreements with Turkey, Iraq, Afghanistan and other neighbors who share water resources with Iran, aggressive hydro-diplomacy must be used. For hydro-diplomacy to be successful, Iran's foreign policy must be changed. The balanced and sustainable growth of Iran should be the Iranian government's top focus rather than only the development of the core regions. Northwestern Iran and its inhabitants will undergo a geographical transformation as a result of Lake Urmia drying up. The primary issue affecting Iran's political stability is the water crisis. In order to alleviate the water situation, new technology must be used, and the way water is consumed in Iranian agriculture must alter. Iran should also implement cutting-edge water management techniques and technologies. This entails using effective irrigation methods, making investments in water infrastructure, and encouraging water conservation strate-

gies. Iran can maximize its water resources and lessen the effects of water scarcity by minimizing water waste and enhancing irrigation efficiency. Agricultural policies need to be changed to encourage water-saving techniques. Reduced water use in agriculture can be achieved by encouraging farmers to use contemporary irrigation techniques, switching to less water-intensive crops and encouraging crop rotation. To make the transition easier, this strategy needs in-depth planning, farmer education and financial support.

Iran is experiencing a severe and unmistakable water crisis, which calls for quick mitigating measures to resolve pervasive water security challenges. Many of the therapies available today, meanwhile, are symptom-focused and short-term in nature. Iran must make significant adjustments to its approach to water management to prevent future catastrophes and secure sustainable water supplies. To create solutions with few side effects, decision-makers must understand the complexity of human-natural systems. While all emerging countries, including those in the Middle East, have the freedom to expand and modernize, it is unnecessary to repeat the environmental sins of Western expansion. Iran has a great chance to reduce the risks connected with the development of water resources by learning from the expensive mistakes made in the West, particularly in the United States and California.[48]

Finally, to solve the Iranian water situation, international cooperation and support are essential. Iran may access foreign know-how, technology and financial resources to implement sustainable water management methods. To support Iran's attempts to resolve the situation, international organizations and donor countries might offer technical assistance, finance for infrastructure projects and knowledge-sharing platforms. A diverse strategy is required to address the water issue between Iran and its neighbors as well as the severity of the crisis inside Iran. To resolve the water issues with neighboring countries, diplomatic involvement, cooperation frameworks and efficient water management practices are essential. To alleviate the water problem and ensure the sustainable use of water resources in Iran, infrastructure development, agricultural policy changes, and international cooperation are essential. Iran can contribute to regional stability, enhanced water security and the welfare of its people by putting these measures into place.

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