In the Midst of the Riparians: Kurdistan's position at the center of an impending water crisis in the Tigris-Euphrates River Basin

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Section I: Introduction

Section II: Water Stress in Iraqi Kurdistan

Section III: Climate Change

Section IV: Internal Water Mismanagement and Bureaucratic Failures

Section V: Geopolitics and Kurdistan's Riparian States
- KRI and Iran
- KRI and Turkey
- KRI and Iraq
- Existing Multilateral Water Policies

Section VI: Policy Recommendation

Conclusion

Section I: Introduction

The Middle East is drying up, and Kurdistan is among the thirstiest regions. Since 2007, the geographic reality of the Kurdish Region of Iraq (KRI) has changed as recurrent droughts, reduced rainfall, and upstream water use continue to threaten the water supply at unprecedented rates. While the entire Middle East and North African region are facing extreme water shortages as a result of resource scarcity and population pressures, the gap between supply and demand is further intensified in the KRI. This report examines the unique water challenges that the Kurdish region of Iraq is experiencing as climate change, bureaucratic mismanagement, and complex geopolitical relationships with upstream riparians are endangering this essential life supply for the Kurdish people.

The years-long drought that Kurdistan is currently facing is a part of a greater global trend of water becoming a major threat to geopolitics and global security. This shift has since led to 'water wars', wherein nations use control of the sea, oceans, and rivers as a military tactic and a tool for exploitation and geopolitical dominance. Understandably, Kurdistan's geographic position along the Tigris-Euphrates Basin places it amid political conflicts between Turkey, Syria, Iraq, and Iran. The complex political relationships between these riparians and the Kurds are shaped, and often manipulated, through imbalances in who can control the water flow in the Basin. With such power competitions and the looming impacts of climate change, water scarcity in the region has quickly become a multidimensional challenge that requires adaptive and comprehensive solutions.

Even then, the Kurdish people are not without blame when it comes to water scarcity in the region. As water becomes more scarce, there has been no concerted effort to bring awareness to water conservation. Kurds, both in the countryside and in the cities, are consuming water in

unsustainable ways. Meanwhile, such misuse of water goes unpunished, wastewater mismanagement is polluting drinking water, and wasteful water use continues to threaten an already depleted supply in the Kurdistan region. Meanwhile, as the Kurdish GDP rises and people experience relative freedoms following periods of poverty, new lifestyles in Kurdistan are further stressing the water supply. The desire for holiday homes with pools, green and luscious yards, and dust-free sidewalks all contribute to the overuse of water resources. Continued misallocation and neglect of this already scarce resource at the hands of the Kurdish people and government is putting Kurdistan at greater risk of desertification now more than ever. As the water supply diminishes, so too will farming and other rural professions. As a result, the demographics of the region will likely change and we will see a mass migration from rural to urban areas. If this happens, the region will likely experience a strain of available public services, an increased cost of living, and more violence and social cleavages. Such shifts in water consumption, internal bureaucratic shortcomings, and political conflicts with upstream riparians have all come together on top of the looming threats of climate change in the once-fertile region. This has brought hydropolitics in Kurdistan to a critical juncture wherein water scarcity is threatening the very future of the Kurdish people. To avoid the possibility of irreversible environmental change and social protests, prompt action must be taken from across different sectors.

Section II: Water Stress in Iraqi Kurdistan

Since the establishment of the world's earliest civilization, Iraq has enjoyed water abundance, known historically as "the land between two rivers". During those ancient days, the Tigris and Euphrates rivers were used intentionally to irrigate Mesopotamia and managed to sustain settlements and people whose names were "written in water." This was a region that, through

strategic manipulation and management of natural water sources, nourished early civilizations and made way for societal advancements in every field as the environment grew lush.

Since then, this once 'fertile crescent' where farming was developed is being dehydrated by climate change and socio-political challenges. NASA and environmental scientists recently identified Iraq as one of the 19 global hotspots where freshwater levels have dangerously depleted. Rapid changes in water availability and prolonged droughts in Southern Iraq have caused the water in Iraq's Mosul Dam to reach its lowest level since the reservoir's construction in 1986. While this revealed the remains of a 3,400-year-old city, it also revealed the severity of the country's extreme drought.

As surface water and groundwater continue to deplete, there is more hope for the country's Kurdish region which is comparatively abundant in water resources given its rivers, snow-capped mountains, rainfall, and aquifers. Even then, the Kurdish Region of Iraq is facing historically low water levels and concerns are rising about the sustainability of limited supplies. According to the Kurdish Regional Government, the KRI gets much of its water from the Tigris, the Great Zab, and Little Zab rivers, in addition to rainfall and groundwater. Despite relative source diversity, these supplies are not enough to keep up with the demand in the region. As the government struggles to find a solution, the already depleted supply is being further strained by farmers in the rural areas and population density in the cities. The Kurdish region has over 17 dams with plans to build nearly a dozen more. These dams currently total a capacity of 10 billion cubic meters of water. The largest of these is the Dukan dam which provides drinking water for nearly three million people in Sulaymaniyah and Kirkuk. Built in 1959, the Dukan dam is now holding only 2 billion cubic meters of water despite having a capacity of 7 billion. We see a similar trend in Sulaymaniyah's Darbandikhan dam built on the Sirwan river which springs from

the Zagros Mountains in Iran and ends in the Tigris. Recently, the water levels of Darbandikhan have decreased by seven meters, bringing it to also operate at only a third of its capacity.

Dukan, Darbandikhan, and other dams around Kurdistan are crucial to the region's flora and fauna and serve as an important life source. The water in these dams is used for irrigation, flood control, and hydroelectric power and is essential for Kurdish survival. Consequently, the water flowing through the Kurdish provinces sustains the region's agricultural sector, fishing projects, drinking water, power production, and a rising tourism industry. Recent threats on the water supply thus threaten the livelihoods of two million Kurds who are at risk of job loss, forced migration, waterborne diseases, and starvation should the region dry up. For farmers who rely on generation-old irrigation methods, water scarcity is already drying out crops and reducing yields. One study from the Norwegian Refugee Council (NRC) projects wheat production in the IKR to decrease by half as a result of these droughts. While a multitude of factors is to blame, unprecedented changes in water availability have exponentially damaged the agricultural sector and cut the harvesting season and total yields short.

Another area where water depletion is proving to be detrimental is in hydropower developments. Dams along the Tigris and Euphrates and their regional tributaries provide inexpensive electricity for domestic and industrial use. In Iraq, the six most important hydropower plants are located in Mosul, Haditha, Hamrin, Samara, Dokan, and Derbandikhan. These sites have a combined installed capacity of 2493 MW, though due to low water levels, they are only operating at 1300 MW. The two most important Kurdish hydropower plants of Dokan and Derbandikhan have total installed/operating capacities of 400/75 MW and 249/70 MW, respectively. Thus, as water shortages impact water levels in the dams, we see a ripple effect on the ability to generate electricity through hydropower. In his 2016 paper on the future

circumstances of hydropower developments in the KRI, Khalid Ahmad-Rashid offers a statistical analysis of energy consumption. His findings reveal that there is a gap between power demand and generation capacity (figure 1). With the exponential decline in water levels and rise of demand since his data collection in 2015, this gap has since grown wider as the present supply of 8500MW across all energy sectors does not meet the current electricity need of 14000 MW. Meanwhile, the electricity demand is further increasing as the desire for sectoral advancements is bringing new buildings, factories, housing complexes, and other facilities to the region. Thus, efficient water management could be key to ending energy shortages in the region.

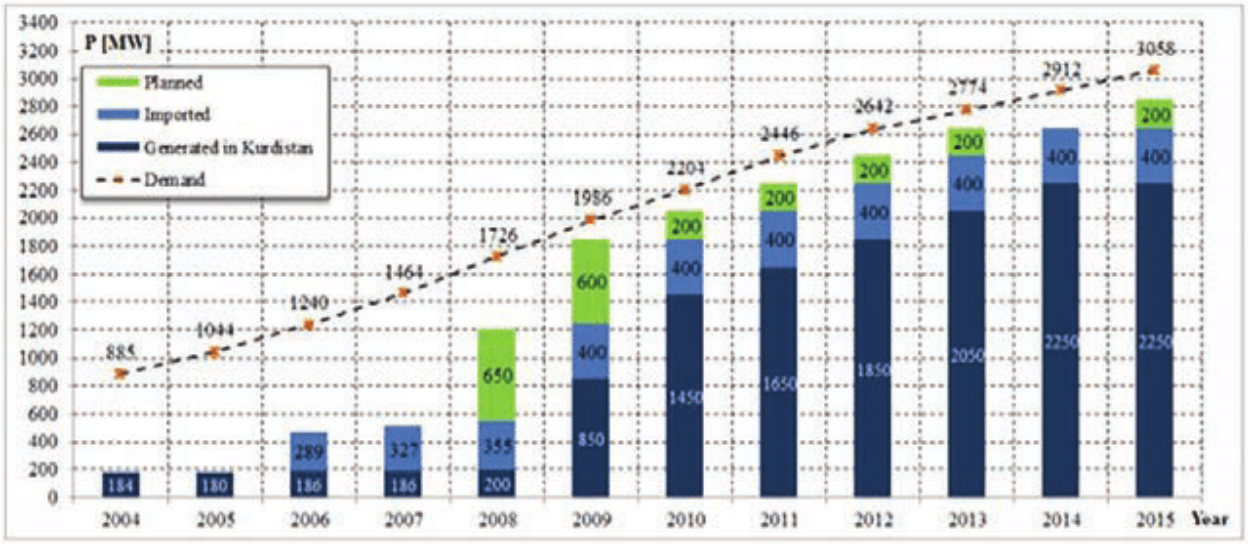

Figure 1. Evolution of power balance in the power system in Kurdistan

Despite being of great importance to the economic and energy sectors, water has also been of historical and cultural importance to the Kurds. Environmental engineer and Kurdish environmental activist, Ercan Ayboga described the importance of this life source to the Kurdish people in an interview with Lifegate.

In Kurdish culture, communities have a solid relationship with their land's natural resources. Mountains and rivers are part of the collective identity. Agriculture still mostly follows rainfall cycles so as not to impact rivers, and water is part of the planning of daily life, it's treated with

respect and used with care. As in many other ancient cultures, the Kurds also have myths and legends linked to water and to their traditions. Water has a symbolic meaning: it quenches thirst, purifies, cleanses the body and the soul.

When this essential life source is at risk, so too are elements of Kurdish culture that for years have surrounded the tropes of riverside picnics, lush mountains and farms, and pomegranate trees. As water depletes, the quality and quantity of fish diminish, the price of produce increases, and farmers must abandon water-intensive crops that were once significant to the region. Meanwhile, the region's flora and fauna will change in ways that may render the Kurdish homeland unrecognizable. Such changes will undoubtedly impact the tourism industry and change Kurdistan across all sectors and regions.

Section III: Climate Change

In 2019, the United Nations Environment Program in their GEO-6 Report classified Iraq as the fifth most vulnerable country in the world to "decreased water and food availability and extreme temperatures, which will negatively affect food security, water security, social security and health security [in Iraq]". Then, in 2021, a World Bank report predicted that by 2030, Iraq will face extreme water scarcity, citing climate change as one of the main causes. Iraq is at a critical juncture wherein climate challenges are no longer being spoken about as imminent dangers in the future tense, but have rather become an already-realized hazard to health and livability in Iraq. Water and its environmental dangers do not respect political boundaries. For Kurdistan, this means that the region can not escape the impacts being realized in Iraq or in the greater Middle East.

As leaders hesitate to take direct climate action, global temperatures are quickly reaching the "point of no return" where the Earth's climate will tip past an irreversible point leading us to environmental breakdown. In Iraq, temperatures are rising 2 to 7 times faster than the global average; so as the global surface temperature has risen by 1.3°F (0.75°C) since the 20th century, Iraq's has risen 4.1°F (2.3°C). These rises are only exacerbated in Northern Iraq, where climate change is an already-realized threat for the Kurdish people. In a 2022 Scientific Conference on Drought and Water Scarcity Management at the University of Garmian in Sulaymaniyah, several researchers came together to present findings on water-related issues in Kurdistan. One project presented at the conference provided a historic overview of temperature changes in the KRI in the past fifty years. In July 2021, the Kurdish region reached unprecedented temperatures of 47°C in Erbil, 45°C in Duhok, 46°C in Sulaymaniyah, and 52°C in Khanaqin. Such excess heat in the atmosphere is drawing more moisture out of the land and atmosphere and making droughts more severe and prolonged in the KRI and Iraq.

As temperatures reach record highs, rainfall has hit record lows in Iraq, especially in the northern governorates and the Kurdistan Region. Iraq itself is categorized by three climate zones: the arid desert of the South, the semiarid steppe of the middle region encompassing Baghdad and Basra, and a Mediterranean climate in the Kurdish region. All three regions across the country are receiving less rainfall with the mean annual rate in Kurdistan decreasing by 100-200mm between the period pre- and post-1941. As a result of climate change, Iraq's seasonal climates have also become more drastic with summers becoming even hotter and drier, and winters becoming even cooler and wetter (Figure 2). Kurdistan is seeing changes in rain patterns like never before wherein the rain is becoming less regular and predictable. For the Kurdish region, this means that the possibility of heavy rainfall following drought is just as likely as sporadic and gradual

rainfall. As a result, the Kurdish region is experiencing a sequence of extreme weather events. In the wet months fluctuations in the annual discharge of the Tigris and Euphrates rivers have caused increasing flooding in the KRI. Flash floods in the region are causing significant damage, killing dozens and wreaking havoc on vulnerable infrastructure as torrential rains hit the hot, dry earth which cannot absorb the water quickly.

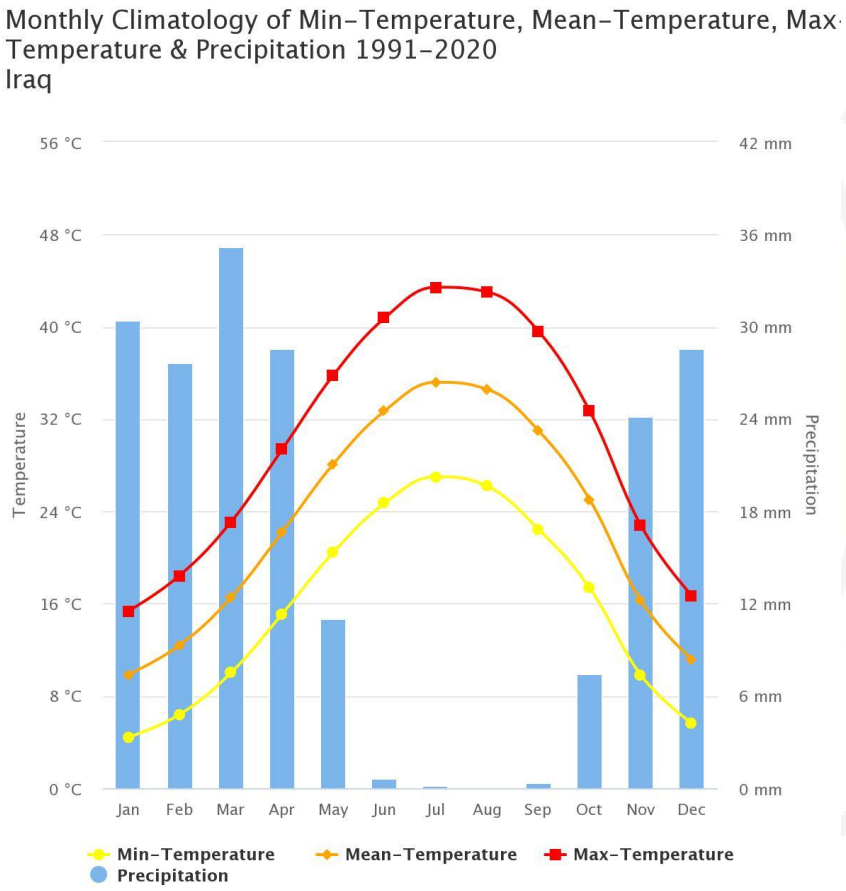

Figure 2. Monthly climatology of temperature and precipitation for Iraq from the period of 1991–2020

Such changes in temperatures and rainfall, when compounded by subsequent weather extremes, will have irreversible impacts on the degradation of water quality for the KRI's rivers and groundwater supply. A recent report from the World Bank warned that "By 2050, a temperature increase of 1 degree Celsius, and a precipitation decrease of 10% would cause a 20% reduction of available freshwater. Under these circumstances, nearly one-third of the irrigated land in Iraq

will have no water by the year 2050." While the odds may be slightly better for the Kurdish region, the low rainfall rate is still affected by high evaporation rates. Together, they contribute to a lack of humidity in much of the KRI. This, in turn, harms the soil biological cycle and increases salinity levels, making it unsustainable for humans, animals, and vegetation while impacting crop yield and water drainage. In this way, climate change creates a perpetual cycle that deteriorates the water supply and makes way for detrimental environmental effects, including those that will further deplete Kurdistan's water supply.

Section IV: Internal Water Mismanagement and Bureaucratic Failures

As the Kurdish region of Iraq benefits from relative water abundance compared to the rest of Iraq, it has the potential to be self-sufficient with proper management; yet, the vulnerable resource continues to deplete in the face of internal mismanagement. In the past decade, the KRI has experienced an exponential growth in total population fueled in large part by the humanitarian crises that have impacted the Levant. This rapid demographic change has put a stain on the government and bureaucratic systems in the KRI. Such changes have further strained water resources, making the water crisis in the region more pressing than ever. This population growth is in large part a result of the influx of Syrian refugees and Iraqi internally displaced persons (IDPs) coming into the KRI. The events that led to this change, namely the Syrian war and the rise of ISIS, led to a 28% increase in the population of the KRI. All the while, there is another migration pattern occurring within the KRI as rural residents are increasingly moving to urban areas fueled by the desire for better jobs and life opportunities. As the population grows, so does the need for a steady supply of clean water. This is especially true for populations of

refugees and IDPs living within camps, where water sanitation can have consequential damages to residents' health.

Within the KRI, decisions about water and the very provision of the resource are impacted by various state and local authorities, each responsible for different subsections of water management to ensure adequate quantity and quality. In a study that explored water management in the region and its intersection with government action, researchers summarized the responsibilities of Iraqi water authorities (Table 1). Different agencies manage different responsibilities, and "the system is complicated, with possibly overlapping rights and responsibilities". The lack of clear parameters at all levels, be it municipal, within the regional Kurdish Government, or even in the central Iraqi government, colludes responsibilities and prevents the government from improving current institutions or implementing solutions to combat this water crisis. Even where policies regarding water consumption do exist, missing legal frameworks and weak law enforcement prevent the intended policy outcomes from materializing. Beyond that, the KRG, local authorities, and private companies all lack the financial resources that it would take to completely eradicate or reverse the water crisis. Successful water management policy also requires the availability of hydrological data to inform current inflow and usage. The lack of water gauging stations and observation wells hamper Kurdish policymakers by limiting their ability to monitor groundwater levels. If water consumption and recharge levels are not well understood, we cannot expect to have clear policies that address the root cause of this water crisis.

Organization	Main Tasks and Responsibilities
Ministry of Agriculture and Water Resources (MAWR)	• Sharing hydraulic and operational information about transboundary rivers (Tigris and Euphrates). • Applying the principle of integrated water resource management (IWRM), similarly to that which is applied in Turkey and EU countries. • Coordinating between water resources and water demand sectors. • Monitoring the surface and groundwater status. • Legislating acts related to protect groundwater bodies. • Planning the application of rational irrigation techniques. • Reclaiming marshlands. • Developing fishery projects through supporting the private sector. • Managing river basins based on the scope of legal exploitation of water supply and the organization of sand/gravel quarry works.
Ministry of Municipalities (MoM)	• Providing and supplying domestic water for both urban and rural areas. • Protecting the water supply networks from leaks and damages. • Legislating the recovery cost instructions of supplied water.
Ministry of Environment (MoE)	• Protecting and improving water quality. • Developing and improving wastewater management. • Employing integrated management of hazardous chemicals. • Performing necessary surveys to specify environmental impacts resulting from the use of internationally prohibited weapons. • Implementing the standard limits of contamination allowed in water resources used for different purposes.
General Directorate of Meteorology and Seismology (GDMS)	• Continuously recording and monitoring meteorological and seismological events. • Forecasting natural hazards such as floods, drought, and earthquakes.
Central Agency for Standardization and Quality Control (CASQC)	• Creating and controlling the physical and chemical standards of water quality for multiple purposes. • Specifying general requirements for non-bottled drinking water, including water produced from water intakes and dam reservoirs, transported through distribution networks and special conveyance vehicles according to Iraqi standards relating to water quality: IQS/417/2001, ICS:13.060.20
Ministry of Electricity (MoEl)	• Planning and constructing hydropower plants.

Table 1. Responsibilities of Iraqi Water Authorities

As weak internal governance continues to impede Kurdistan's ability to mitigate water problems, policymakers argue that citizens and individuals have a responsibility to prevent further water depletion and environmental degradation. Consumption levels and unsustainable water practices at the hands of residents and constituents contribute to the current water crisis in a multitude of ways. When the government and its institutions fail to provide enough water to meet local demand, the people — especially residents in the countryside — often take matters into their own hands and dig illegal wells. Well-digging as a practice went unregulated in Kurdistan until Instruction No. 1 of 2011 was passed, consisting of 14 articles that regulated well-drilling. This legislation was the first of its kind to establish a strict licensing regime for well digging in the region in hopes of addressing the dramatic increase in unauthorized digging that deplete groundwater. Today, well digging is only permitted with a license from the government. In practice, this policy acts more as a fee with some saying that acquiring the permit only requires

knowing the right people and paying the $1,700 - $2,500 fee. Unsurprisingly, this policy did not effectively prevent further illegal well-digging, and a 2018 study estimated that 11,000 out of the 25,000 wells in the IKR were illegally drilled. In some villages, including Chaqlawa, houses are not connected to the main water pipeline, forcing residents to share wells with one another. Among residents of the KRI, there is also a lack of awareness of water conservation which has further exacerbated the water crisis. All around the region, shopkeepers can be found using water for routine cleaning, homeowners leave hoses running for hours in their gardens, and farmers continue to use century-old irrigation methods that are no longer efficient. Such practices, along with institutional and governmental shortcomings, continue to deplete already scarce water resources. As government actors and local residents get caught up in this blame game, the water crisis poses an immediate threat to the future of the Kurdish Region of Iraq.

Section V: Geopolitics and Kurdistan's Riparian States

The Middle East is constantly riddled and categorized by conflicts over oil and disputed territories, but the question of who controls water resources serves as an equally important threat to the region's stability. In the Tigris-Euphrates Basin, the politicization of water resources and associated power tensions go back to the creation of the borders that now make up the riparian nations of Turkey, Syria, Iraq, and Iran. Under the Ottoman Empire, the waters of the Basin were managed efficiently until the end of World War I, when the state lines were drawn across the modern Middle East in the Sykes-Picot Treaty. Dividing up the borders did not only have a lasting impact on the Kurds by denying them a sovereign country, but it also meant that the waters of the Tigris and Euphrates now had to be shared by their surrounding states. As populations grew, nationalist sentiments rose, and the countries became increasingly

power-hungry, water quickly turned into a source of leverage over downstream neighbors. Today, water in the region is a tool of power and dominance and has heightened many socio-political tensions in the region, especially in an attempt to further marginalize the Kurdish people. In the KRI, 70% of the water in the region comes from outside Iraq. Blockages and restrictions on downstream water flow from Kurdistan's upstream riparians have decreased the KRI's inflow by 80%, causing extreme water level decreases and resource depletion. In this region, water is a weapon. Having recognized this, Turkey and Iran have used dams as cannons to indirectly harm the Kurdish people downstream. This then causes a ripple effect wherein the KRI can have a great impact on the downstream flow into the southern marshes that are drying up at catastrophic rates. In this way, unilateral hydraulic projects and the manipulation of natural water flow are likely to exacerbate existing shortages, climate change, and groundwater exploitation. Undoubtedly, the water crisis in Kurdistan and surrounding areas has become a deeply political issue.

KRI and Iran

Water has long been used as a tool to advance political strategy against the Kurds between Iraq and Iran. In 1975, a protocol was signed into agreement in Algiers where then-President of Iraq, Saddam Hussain, gave up Iraq's hold of a part of the Shatt al-Arab in Basra under the condition that Iran would no longer support the Kurds and their rebellion in Iraq. Notably, following the invasion in 2003 by coalition forces, Iraq was unable to maintain a grip on political decisions and gave up essential water rights to the dominant Iranian government. Such examples in history serve as precursors for Iran's dominance of shared waters in recent decades. Crucially, two river basins of the Tigris — the Little Zab and Sirwan — have headwaters in Iran before reaching the

KRI. Iran has now taken it upon itself to seize the power potential of these rivers by building several dams along them and passing the projects off as sustainable development campaigns to tackle water scarcity within Iran. This started in 2009 with the building of the Daryan Dam which is just 28.5km from the Iraqi border, along the Sirwan River; then in 2011, after the Sardasht Dam was built 9km from the Iraqi border along the Little Zab. Once the Dam began running in 2017, Sulaymaniyah immediately experienced a shortage of drinking and irrigation water. Since then, Iran has been on a dam-building spree as they intend to construct 109 new dams, causing the water levels of the Sirwan and Little Zab to fall significantly. Such changes in the downstream flow of water from Iran have already impacted hundreds of thousands of Kurds reliant on water from these two rivers for drinking, farming, and day-to-day water use.

In an interview with the Middle East Eye, Halabja's deputy governor, Kawa Ali, expressed that his main concern with Iran's projects is the Nawsud water tunnel that diverts water away from the Kurdistan region and toward West Iran. Ali stated that this would result in a nearly complete depletion of drinking water for Halabja and create tremendous obstacles for fishing and agriculture in the region. He then spoke on the potential for this decision to lead to socio-political conflict as they "will lose trust in Iran, which they saw as a savior during the chemical attack on the city in 1988". Iran has recently taken this one step further and is attempting to profit off of Kurdish dehydration and make the region more reliant on Iran than it already is given water restraints. In Halabja, Iranian officials have proposed selling electricity to the province from the energy that they harnessed as a result of redirecting water from the Sirwan river. Residents of impacted areas in the KRI have also expressed concerns about Iranian dams harming Kurdish crop yields. They say that as a result, it has become cheaper and more efficient to import produce from Iran than it is to grow them locally in Kurdistan as they once did. Iran is acting unilaterally

and without restrictions to take control over once-shared waters, and Kurdistan is drying up as a consequence.

KRI and Turkey

> *If you see water as a weapon, dams are the new cannons. Iraq has the oil, Turkey has the water, and sometimes, it's much better to have the water."* *Ulrich Eichelmann*

Turkey's history of imperialism and aversion to the Kurdish people is nothing new, but the Turkish government's water policy and related developments often go overlooked as tools to exercise direct control over the Kurds. Nearly 90% of the water in the Euphrates and 40% of that in the Tigris originates in Turkey. Turkey has long been aware of the incredible power that this gives them and began harnessing water as a tool for power generation in the 1930s under the leadership of Mustafa Kemal Ataturk who founded the Republic. In the 1960s, conversations began for a large-scale development project that would maximize the region's abundance of water for social development projects via hydroelectricity and eventually give them immense geopolitical control over the downstream Kurds. This materialized as the Southern Anatolia Project – Güneydoğu Anadolu Projesi – (GAP) regional development plan. With 22 dams, 19 hydroelectric power stations, and infrastructure development, GAP is the largest and most expensive project in Turkey to date while boasting a sustainable human development approach. The project's centerpiece and pièce de résistance is the 84.4 million cubic meter Ataturk Dam, the third largest in the world. This $2 billion dam generates enough electricity to provide power for over a million households in Turkey, and it has done so at the cost of water flow to the KRI. Problems with water supply in Iraq were exacerbated by the dam's construction in 1975. Since then, the Ataturk Dam has cut water flow to Iraq by 80%; but given its economic benefits,

Turkey has decided that it is worth the displacement of 80,000 people over 125 square miles in the predominantly Kurdish region. Here we again see the pattern of upstream socio-economic prosperity at the cost of downstream Kurdish livelihoods as the water available for drinking, agriculture, and fishing diminishes.

Figure 3. The reverse of the 1 million Turkish lira banknote, depicting the Atatürk Dam (1995–2005).

Such tensions resulting from Turkey's GAP project are complicated and reinforced by political tensions between the Turkish government and the Kurdish Workers' Party (PKK). As the PKK gained more traction as a separatist organization and Turkey's GAP project came to fruition, Turkey quickly took to gaining coalition support from Iraq and Syria through an almost quid pro quo that created water protocols in exchange for their support in combating the PKK. As tensions rose and Turkish-Kurdish relations further deteriorated, "Turkey's grip on its neighbors' fate through control of water only tightened, bringing drought to once-fertile Syrian and Iraqi farmlands, drying up entire villages, and forcing people to relocate to cities". Political tension and water supply came to have a clear and direct correlation in the region. Even as Syria experienced a crippling drought, Turkey showed no signs of loosening their grip over water resources. The economic and political volatility that ensued made way for violence, unrest, and

eventual mass migration. More recently, the Euphrates serves as a line of delineation both between Turkish-backed rebels and American-backed Kurdish militias, and between Turkish prosperity and the parched and depopulated lands of Kurdistan. As Turkey exercises full control of the water that originates in its borders, its infrastructure projects further disrupt the PKK and Kurds in surrounding areas and their attacks on the Kurdish region continue to directly harm civilians as per a recent report by the Washington Kurdish Institute. All the while, Turkey's claimed sovereignty over this natural resource and is taking away resources and attention from Iraq that could instead be used to combat this climate crisis.

KRI and Iraq

Many of the impacts of the water crisis are only more severe for the southern region of Iraq which suffers from being the furthest downstream region of the Tigris Euphrates basin. As a result of water scarcity and depletion, central and southern Iraq is experiencing an environmental collapse. The droughts that have plagued the region since 2017 have caused essential water sources in the region to dry up. The water levels in Lake Milh, for example, have decreased from 112 feet above sea level to just 66 since the beginning of the drought. As Turkey and Iran reduce water flow into Iraq by nearly 80%, the once famous marshes of Iraq are becoming severely damaged to the point where the wetlands are threatened by extinction. Meanwhile, climate change and higher evaporation rates have led to increased salinity. Crucially, central and southern Iraq do not benefit from water abundance as the Kurdish region does, making such changes in water availability even more threatening. According to the Food and Agriculture Organization, water shortages in the southern region have driven much of the rural community — a community reliant on farming, fishing, and herding — to poverty, forcing many to migrate

to the cities for work.

As water becomes more scarce, perceptions toward Kurds are shifting in southern Iraq and more people are putting the Kurds to blame for water overuse that is causing the southern marshes to dry up. Undoubtedly, just as Kurds have hydro-political tensions with their upstream riparians, tensions also exist between the Kurdish Regional Government and the downstream Iraqi government. Since the 2017 Kurdish referendum on independence, the relationship between Erbil and Baghdad has become more strained as the two governments try to settle disputes on territory, oil, and water resources. Under Section 8 of Article 110 of the 2005 Iraqi Constitution, it is stated that the federal government has exclusive authority over “Planning policies relating to water sources from outside Iraq and guaranteeing the rate of water flow to Iraq and its just distribution inside Iraq in accordance with international laws and conventions". Consequently, until Kurdistan is recognized internationally, the KRG cannot engage in multilateral water agreements without negotiating through Baghdad.

While this strains the KRG’s legal and diplomatic options for navigating this water crisis, the KRI has de facto power over the flow of water into central and southern Iraq which it can, and has, used as a leverage point. Kurdish officials have on occasion threatened the federal government with cutting water flow during disagreements on everything from annual budget allocations to the cross-regional movement of poultry. In response, the Iraqi government has accused the KRG of violating both the Iraqi constitution and human rights principles. Such condemnations do not change the hydrological reality of Iraq as “No matter the exact course of the border, administrative model, degree of sovereignty or political leadership, the Kurds will, by geography, always control Tigris water resources in Iraq”. Since 2014, 245 dams have been proposed in the KRI, and with dozens already under construction, there will likely be a continued

straining of relations. This will present further political challenges between the KRG and the federal government, but will likely also lead to increased tensions between ethnic groups, tribes, and governorates as everyone in Iraq continues to fight for water.

Existing Multilateral Water Policies

While each country has differing ideas of how the water in the region should be managed, there do exist several international laws that apply to the Tigris Euphrates basin and attempt to stop the monopolization of international waters. In 1997, the United Nations adopted the Convention on the Law of Non-Navigational Uses of International Watercourses to establish laws governing water and promote peace and sustainability. Turkey was one of only three countries to vote against the Convention. Under this law, each riparian state must show a dedication to the preservation and fair use while also preventing any harm to the other countries sharing the water. Turkey's development projects and its unilateral policies that claim a greater share of international waters breach the articles included in the Convention. Aside from international law, there is no clear regional or multilateral agreement regarding water usage in the entire Tigris Euphrates basin. In 1980, Turkish development plans began demanding more coordination and Iraq proposed the creation of a permanent Joint Technical Committee (JTC) to promote multilateral water cooperation. After Syria joined in 1983, the three countries held sixteen meetings until 1993. After that, the JTC could not fulfill its mandate, and negotiations became deadlocked as the countries could not reach an agreement on procedures. As the current state of affairs in the region becomes more strained, institutional deficiencies persist, and the threats of climate change loom over, the KRG is struggling to effectively combat the water crisis through policy change.

Section VI: Policy Recommendation

Despite being plagued by institutional and technical limitations, the Kurdish Region of Iraq has a multitude of policy options that it can implement at local and federal levels to improve water resource management in the region. Sectarian tension, the rise and fall of ISIS, political uncertainty, and changes in regional demographics have all taken a toll on the region and prevented the implementation of actionable policy options. Even when the regional government attempts to remedy the water crisis, they are plagued by financial and institutional limitations. Nonetheless, hydropolitics in Kurdistan is at a critical juncture. While the Kurdistan region has historically had a sufficient water supply, external factors including Iran and Turkey's policies along with internal water mismanagement are rapidly deteriorating the already diminished supply. Since the 1980s, water flows from the Tigris and Euphrates have dropped by 30% and water reserves in the KRI are nearly 50% lower than last year. Such shifts in the water supply have displaced thousands and rendered historically arable lands nearly uninhabitable. If a drastic change is not made soon, experts warn that the Tigris and Euphrates could go completely dry by 2040.

In recent years, political leaders at all levels have identified the immense challenges that have resulted from the water shortage and have subsequently placed hydro policy on the political agenda. Accordingly, more resources are being allocated to improve water infrastructure in the region. KRG officials warned in 2021 that the region was already in the midst of a severe water crisis due to droughts, the building of dams in Turkey and Iran, and a lack of government funding. In June of 2021, the KRG announced 2.5 billion dinars (approximately 1.7 million USD) "to resolve the issue in providing drinking water to houses as a first step in provinces and

independent administrations". In April of 2022, Erbil governor Omed Khoshnaw pledged to support his constituents suffering from the water shortage while also warning against overconsumption and unsustainable water use at the hands of citizens. The Erbil province has since allocated 7.6 billion dinars (approximately 5 million USD) to drill 138 wells, with an additional 4.7 billion dinars (approximately 3 million USD) to repair existing wells. Meanwhile, in an attempt to fight dams with more dams, regional authorities have set plans to build 240 more dams and reservoirs. However, with the recent financial crisis, nearly all of the construction plans have been placed on hold as they await funding. Even then, it is uncertain whether these large-scale infrastructural plans are the most appropriate solution as they do not do anything to tackle existing shortages caused by overconsumption and poor management.

At higher levels, Qubad Talabi, Deputy Prime Minister of Kurdistan announced that the government is developing plans to save water resources and ensure equitable access for citizens. Officials have also mentioned the desires to increase diplomatic talks with Iran and Turkey to unblock the flow of water to be consistent with international standards. Changes are also taking place in the Iraqi government as President Latif Rasheed recently announced plans to establish a top council to manage water policy and ensure fair use of the rivers flowing into Iraq. The KRG and its federal court will be a part of the council, he stated. Crucially, while the KRG did not participate in this year's COP27 climate summit in Egypt, President Latif Rashid did. There, he emphasized water challenges while calling for greater multilateral cooperation from the neighboring countries. Even then, the funds currently being allocated to address the issue are not enough, and despite the policy window being open, the state of the water crisis in the KRI and greater Iraq has not improved.

To evaluate the strength of the different policies, the criteria of effectiveness, financial cost, and

sustainability should all be considered. A successful policy is one that most quickly reduces water consumption and prevents further water loss in the future, and is also mindful of funding limitations within the KRG and Iraqi governments.

The most immediate change that can be made is to develop education programming around water consumption for residents in the KRI. Through this option, local NGOs, climate activists, and humanitarian actors can promote programs and awareness campaigns that educate residents on water conservation practices and the dangers of overconsumption. Several activists and government leaders have expressed disdain at water mismanagement at the hands of citizens as many farmers have not converted to modern irrigation systems. As a result, people have taken to digging illegal wells and sharing water wells as groundwater depletes. Through allocating funds to train farmers on more efficient irrigation techniques, Kurdistan has the potential to revive the dying agricultural sector and prevent further forced environmental displacement. Meanwhile, shopkeepers and residents in the cities can be warned about the dangers of water overconsumption and water pollution. In tandem with awareness programming, the government should also provide support to repair and expand water networks, especially in rural regions. As the adoption of water-saving techniques and irrigation systems are introduced, metering should also be incentivized to limit over consumption. Such programs will encourage generationally unsustainable water use to end and will cost much less than development plans that require the construction of large dams and reservoirs. This grassroots approach places power into the hands of residents and equips them with the tools and skills to increase the water supply locally. Crucially, it will also target overconsumption as one of the primary causes of shortages in the region not caused by scarcity.

In the issue of regional water scarcity, the most effective policy would be to resume diplomatic

negotiations on water discharge with Iran and Turkey. However, given that the feasibility of such negotiations is dramatically strained by current socio-political conflicts, it may take years to reach a fair use agreement between the three countries and their Kurdish territories. Meanwhile, Iraq is struggling to develop its institutions and water frameworks while making little progress on negotiations about dams with Turkey and Iran. The Kurdish region is also limited by poor institutions and their policy options are limited as most water projects are the jurisdiction and responsibility of the Iraqi Government. Consequently, the KRG should create a coalition with the Government of Iraq (GOI) in the meantime and create a joint task force to develop response plans and clearly define the responsibilities of water authorities at all levels. Turkey and Iran's disregard for international treaties through their pursuit of unilateral hydraulic projects has proved equally detrimental to the IKR and greater provinces of Iraq. As climate change and the impacts of the water shortage do not respect political boundaries, this issue must be tackled through regional cooperation both between the IKR and the GIO and between Iraq and their upstream neighbors. In working jointly, the municipal and federal governments in Iraq can work together to achieve equitable water sharing in the Basin and begin lobbying for a long-term solution for fair use in the basin. If Baghdad and Erbil come together to create a coalition to tackle their shared water crisis, this policy will reduce information asymmetries and lead to more effective policies down the road that will ultimately resume dialogues with Turkey and Iran. Crucially, such negotiations must be made under international oversight, especially as ethnic tensions and conflicts over oil and territory persist. This policy option utilizes diplomatic efforts to solve water disputes and is an essential first step toward promoting necessary cooperation among riparian countries.

Without proper coordination mechanisms, policies implemented by the KRG may do more harm

than good to the existing water supply. If the Kurdistan Region wants to make actionable changes toward ending this water crisis, the KRG must first centralize and formalize water management to establish clear parameters at all levels. As the management of water resources is a critical factor contributing to the water crisis, the Government must increase interministerial communications and centralize information processing to close gaps and smooth out bureaucratic water management. Accordingly, Kurdistan should establish a high council to manage water resources and related policies. This would bring together representatives from each ministry and be a more holistic approach to water management wherein the committee can review water demands across all sectors and industries and respond accordingly. Such a policy would reduce information asymmetries and reduce the discretion of high officials. For example, "none of the Ministry of Agriculture and Water Resources staff attends meetings between the Ministry of Natural Resources (MNR) and operators in the oil and gas industry" leaving little accountability for oil companies to report their water consumption. Integration and centralization of information, data, and responsibilities will undoubtedly take time and financial resources but will improve policies through effective coordination and improve the monitoring and implementation of water policies. Such a change has the potential to dramatically balance water allocation for household, agricultural, and industrial uses as current water levels continue to diminish.

Conclusion

To the Kurds, water is more than just an essential resource, it is the lifeblood of the region that for centuries has kept alive the mountains and made this region one of the most abundant in the area. Now more than ever, the Kurdish Region of Iraq needs forward-looking national water policies that can stand up to the aforementioned hydro political trends that are rapidly depleting

the water supply in the region. While such changes will be costly, maintaining the status quo presents a threat to the stability of the entire Kurdistan region as water shortages will continue to fuel local violence as well as the strategic interstate weaponization of water and change the region's geography beyond irreversible points. If this happens, Kurdistan's famous flora and fauna, residential areas, and landmark archaeological sites could all be submerged within a few decades. The effects of climate change have already become impossible to ignore, and the cases of Iraq and the KRI are quickly becoming an example to the rest of the world of what environmental catastrophe can look like. Its case is being used to provide a glimpse into what the future may look like should policymakers fail to make a change. With hopeful plans to expand the oil sector and become a net exporter of oil, the KRG will require the sourcing of additional water resources and will need to follow up with efficient management of such resources. Kurdistan is currently at a critical juncture and subsequent policies could mean the difference between the end of Kurdish prosperity, or, if a change is made rapidly, the persistence of Kurdistan's development and political objectives that are fueled by the region's water and oil resources.