

## Political and Military Conflict on the Current Water Crisis in Iraq

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**Abstract:**

Previously home to fertile lands and sufficient water, Iraq is now facing a water crisis. Water supplies are shrinking and contamination is increasing. While environmental factors affect these trends, geopolitical relations and current conflict within the Middle East also provide explanations for the decrease of water supply and quality. By using Iraq as a case study, I examine these political forces in relation to the water crisis. Using qualitative sources and analysis, I find that the international relations between Iraq and Turkey, Saddam Hussein's political regime within Iraq, and the history of conflict in Iraq all help explain this water crisis. The findings show that in order to reverse these trends, serious attention must be placed on the water politics within the region and conflict surrounding water sources must be avoided.

## **Introduction**

In August 2014, the Islamic State of Iraq and al-Sham (ISIS) gained control of the Mosul dam in Northern Iraq, which is the largest dam in Iraq and the fourth largest in the Middle East. While Iraqi forces quickly recaptured the dam ten days later, sufficient damage had been sustained to make the Mosul dam the world's most dangerous dam (Collard 2016; Damon 2016). The danger lies in the possibility of breaching due to insufficient maintenance. Specifically, the failure of both ISIS and the Iraqi government to grout the dam daily resulted in a weakened foundation and increased the leakage of the dam. Some of these leaks require 50 tons of cement daily to keep from breaching (Collard 2016). If not fixed, these leaks could significantly weaken the dam to the point of breaching, which would send water rushing throughout the entire Tigris river and inundate the city of Mosul with an estimated 70 feet of water (Embassy of the United States Baghdad Iraq 2016). This flooding would result in at least 500,000 fatalities and leave lasting, negative repercussions on food production, infrastructure, and water quality (J.S. 2014; Vidal 2014; Borger 2016).

In addition to threats of extreme flooding, Iraq also faces the immense challenge of water shortages. Since 1975, Iraq has seen a significant drop in water supply from the Tigris and Euphrates rivers. Previously, Iraq enjoyed nearly 40 billion cubic feet of water annually; now, however, Iraq only receives approximately 11 billion cubic feet annually (Jongerden 2010). As a result, renewable water sources per capita shrunk from 12,000 cubic meters in 1975 to 3,000 cubic meters in 2014 (Shamout and Lahn 2015). Furthermore, many sources estimate the Tigris and Euphrates will not reach the gulf by 2040 (Al-Ansari and Knuston 2011). This decrease of

water supply, of course, significantly impacts the country.

First, water usage is directly linked to agriculture and food supply. Irrigation for agricultural purposes constitutes approximately 66% of Iraq's water, and as a result, a change in water supply dramatically affects agricultural yields and food supply. Second, the decrease in water most notably affects Iraqi citizens: potable water has steadily decreased from the already-low amount of potable water within the country. Third, water supply affects the overall environment of the region. Decreased water availability typically results in highly saline soils, which negatively affects food crops and plant growth. Smaller agricultural yields and decreased vegetation coverage results in less fertile soils, increased dust pollution, and lack of biodiversity.

Given the severity of the problem, many theories exist in order to explain the phenomenon of water shortages. Most sources point to environmental factors, and, indeed, the environment does play a role in determining water quantity and quality of a given region. Due to Iraq's arid climate, scholars suggest decreased rainfall and climate change precipitated the current shortage of Iraq's water (Moridnejad et al 2015; Voroujan et al 2013; Taylor et al 2013). However, the rate of water shortages does not mirror the rate of decreased rainfall in the region (al-Ansari 2011), which implies other factors must explain the present water crisis in Iraq.

Other theories attribute the water crisis to the creation of dams. It is well documented that dams typically bring about many undesirable effects. As seen throughout the world, creation of large dams contributes to loss of biodiversity (Kingsford 2000; Vorosmarty et al 2010), water quality (Zhang et al 2010; Wei et al 2009), and, of course, water supply (Kingsford 2000; Batalla et al 2004). However, these theories mainly explain the relationships between dams and water supply but fail to explain the political background associated with the creation of dams.

Clearly, both the decreased water supply and the imminent threats of breached dams highlight the complex water issues facing Iraq, yet the explanations for this phenomenon are not obvious. Environmental factors, such as climate change or fluctuations in annual rainfall rates, do not sufficiently explain the water issues, and intrastate political elements also do not provide a full explanation. However, international politics do play an influential role in the water crisis. Indeed, this paper demonstrates that the interaction between regional politics and the continued state of instability in Iraq since the 1970s have directly impacted the water situation in modern day Iraq.

Essentially, this thesis is two-fold. First, I posit Iraq-Turkey politics and the Iraqi internal political climate impeded the Iraqi government from implementing sound water policies; these decisions or lack thereof resulted in construction of unsafe and unnecessary dams. Second, I posit the continuous conflict within the region, especially the spread of ISIS, directly contributed to poor management strategies by the Iraqi government. Indeed, the continued conflict required the Iraqi government to disregard water management as a top priority in domestic or foreign policy. However, this failure to prioritize water management has resulted in dangerous water situations which have serious repercussions for both individuals and the environment in Iraq.

## **Literature Review**

Fortunately, a large body of literature exists which examines the political aspect of dam building and water shortages in Iraq. Many scholars identify the unilateral decisions of Turkey as the cause of most water shortage problems. These researchers state that Turkey did not adequately negotiate with Iraq regarding the management of the Tigris and Euphrates rivers (Shamout and Lahn 2015; Sabah et al 2015; Kut 1993; Williams 2012; Nature Iraq 2016).

Additionally, sources look at the relationship between conflict and water sources. As stated previously, many of the studies focusing on the relationship between conflict and water typically identify water as the cause of conflict. Especially in arid regions such as the Middle East, access to water is essential to the continuation of a civilization in order to trade, transport items and ideas, and irrigate for agriculture. Thus, maintaining control over water plays a significant role in relationships with other groups, especially those groups which depend upon the same source of water. Therefore, many theories posit that water shortage contributes to or escalates the conflict within countries (Barnett 2003; Solomon 2010; Star 1991; Wolf 1999; Wolf 2007).

This water caused conflict can be seen throughout history (Mithen 2012), yet in the case of Iraq a reverse causal relationship is present. However, there is a growing body of literature that focuses on a different relationship between conflict and water shortages. Indeed, some studies posit water shortages provide an excellent opportunity for conflicting sides to negotiate peace (Dolatyar and Grey 2016; Dinar 2009; Fischhendler, Dinar, and Katz 2011). Others posit water shortages can only be seen in light of the political economy: the shortages are neither the absolute cause or product of conflict (Selby 2005). Thus, water acts a medium for political arenas (Mirumachi 2015, 5). I posit that rather than water issues instigating conflict in the region, the conflict in Iraq has created, and will continue to create, the water issues in present-day Iraq. This paper shows that the conflict and instability in Iraq since the 1970s negatively affected the government's ability to successfully negotiate water treaties with surrounding nations, specifically Turkey.

## **Methodology and Definitions**

In order to study the impact of conflict on Iraq's water crisis, I conducted a qualitative

study of the problem. Using Iraq as a case study, I analyzed the political and military history of the region, focusing specifically on Iraq from 1970 to present. My methodology focused purely on qualitative data. I searched for documents and historical events that highlighted key political and military conflicts within the region. I then found documents that highlighted the current negative trend of water supply and increased fear of flooding from dams. Then, using my theory I explained the causal links between political and military conflict and the water crises within Iraq.

In order to understand this paper, the dependent and independent variables must be identified. It must be noted that all the data for the paper is constrained to a forty-six-year time period between 1970 and 2016, and the dependent and independent variables are consequently limited to that time as well. In this paper, my main outcome of interest is the water crisis facing Iraq. The term water crisis is certainly a broad term, implying a variety of different factors. However, for the sake of this study, water crisis refers to the water shortage and breaching of Iraqi dams. This definition, of course, also implicitly includes the negative side effects of water shortage (e.g. lack of potable water, decreased irrigation for agriculture, poor sanitation) and the breaching of dams (e.g. 500,000 - 1,000,000 fatalities, destroyed infrastructure, flooded cities, decimated crops, loss of power). Thus, water crisis specifically refers to water shortage and breaching of dams, but also implies the aforementioned consequences.

Given the complexity of this problem, I have chosen to focus on two key independent variables. The first is political conflict and refers to the struggles found within the Iraq political system. This includes tension among political groups within Iraq, such as the Ba'ath party or PUK, as well as tension among international figures, mainly Turkey and Syrian officials.

The second independent variable is military conflict in Iraq. Military conflict consists of any type of conflict that used official military force or was seen as a sign of aggression. Therefore, this definition includes any military efforts executed by Saddam Hussein or the ruling government entity as well as any military force used by insurgent or terrorist groups. The actions of the United States military, specifically post-2003, is also included in this definition. Finally, the conflict created by the emergence of ISIS is also included in the definition of military conflict. An in-depth analysis of all these factors is presented later in the paper.

## **Historical Background**

Iraq is home to the most famous rivers in the world: the Tigris and the Euphrates. Despite the current arid climate, Iraq was previously referred to as the Fertile Crescent and some of the earliest civilizations began there. It was in this fertile area that humans began to irrigate and domesticate crops. This domestication of crops led to miraculous innovations and these early civilizations set the foundation for many modern societies. These societies flourished, in part, because of the bounteous water supply provided by the Tigris and Euphrates rivers. However, over centuries of misuse and poor agricultural practices, the soil began to be overused and yielded continually smaller amounts of crops. Consequently, Iraq and the surrounding regions became an arid area, meaning the soil dramatically decreased in fertility (Strong and Davis 2016), but the Tigris and the Euphrates rivers fortunately still flowed strongly. However, at the end of the first World War, the Ally powers dissolved the Ottoman Empire and created the current boundaries of Iraq, Syria, and Turkey. The creation of these artificial boundaries complicated a variety of factors, including the politics of water (Gee 2016). Thereupon, instead of one autonomous ruler controlling the powerful rivers, the rivers were divided up into parcels



between the new nations. This division would forever alter the fate of the Tigris and the Euphrates rivers.

At first, Iraq and Turkey successfully negotiated water rights between their respective countries. In 1946, shortly following the dissolution of the Ottoman Empire, Turkey and Iraq signed a treaty drafted by the League of Nations which outlined the different articles and protocols necessary for “friendly and neighborly relations” (United States 1946). The first article and protocol relate to the management of the Tigris and Euphrates rivers, and states Turkey cannot make any drastic changes to the water flow without negotiation from Iraq. However, since the signing of that treaty 80 years ago, Turkey and Iraq have yet to officially enter into any other type of treaty regarding water management of the Tigris and Euphrates rivers. This relatively relaxed approach to water management did not pose any initial problems and despite the construction of dams in both countries, no legitimate concern for water arose. However, beginning with Saddam Hussein’s rise to power, water crises emerged, and the lack of legal restrictions resulted in escalation of conflict ensued by Saddam’s regime.

## **Theory and Argument**

The shift from relative peace to political and military conflict resulted in a dramatic affect on the water crisis within Iraq. Indeed, the progression of the water crisis within Iraq paralleled the escalation of political and military conflict, culminating in the removal of Saddam’s regime and the outbreak of civil war in 2006. This section examines the relationship between political and military conflict on the water crisis, specifically water shortages and dam threats.

### *Political Conflict and Water Shortage*

Prior to 1975, Iraq and Turkey did not face any significant problems relating to the water

supply of the Tigris or Euphrates river. Rather, the river flows were high in both countries, and the water was sufficient for both country's needs. Yet as the Iraqi political climate shifted to a more authoritarian rule during the 1970s and became progressively convoluted throughout the years, conflicts emerged which directly influenced water supply.

Before 1972, water flows of the Tigris and Euphrates were relatively undisturbed, and except for an occasional meeting (in which no water matters were decided due to poor diplomatic relations and inadequate preparation of attendees), Turkey and Iraq never truly negotiated water rights (Shamout and Lahn 2015). However, conflict-prone tensions materialized during the Turkish development of the Southeastern Anatolia development project, also referred to as GAP. This project proposal cited improvement of the status of women and minorities living in the Southern Anatolia region, but these reasons do not account for the construction of 22 dams along the Tigris and Euphrates (Williams 2012; Shamout and Lahn 2015). It is clear that the Turkish government's desire to construct dams did not rest upon fears of water shortage. There is no significant data to show water shortages as an instigator for GAP as Turkey enjoyed high levels of water flow during this time (Harris 2002). Indeed, Turkey, Iraq, and Syria all enjoyed high levels of water during between 1938 and 1972. Yet, the construction of these dams significantly restricted the Tigris and Euphrates and thus directly contributed to the water crisis in Iraq.

The consequent water shortages stemmed not only from Turkey holding water in their new reservoirs but also from poor irrigation practices, which were only worsened by the changes of water flow. According to some sources, Iraq, Syria, and Turkey enjoyed a constant average output of water for any given month. From 1938 to 1972, the average amount of monthly

discharge for the three countries ranged from 500 to 1000 cubic meters per second during winter months and reached up to 2,800 cubic meters per second in the summer months (Shamout and Lahn 2015). This variation in seasonal discharge is typical of snow-melt flow, and this pattern has been consistent throughout history. Ancient and modern civilizations depended upon the predictability of snow-melt trends, especially in relation to agriculture. However, intentional or not, GAP significantly altered the snow-melt cycle of the bordering countries, Iraq and Syria.

Rather than simulate a low-high season comparable to the natural flow, Turkey used the dams to control water flow to neighboring countries. As a result, Turkey capped the average monthly discharge to approximately 1000 cubic meters per second (Shamout and Lahn 2015), and sources state GAP depleted Iraq's water flow by 80% over the years. Additionally, Turkey continual efforts to fill their reservoirs could effectually halt all water flow to Iraq and Syria (Harris 2002). Unfortunately, while this control of the water undeniably changed the nature of the river flow, the local farmers did not subsequently change the nature of their irrigation. Dependent on flood cycles for millennia, the farmers essentially only knew irrigation methods utilizing flooding patterns (al-Ansari 2013).

As a result, current-day Iraqi farmers continue to use flood irrigation techniques, but the rivers simply cannot support such practices. Furthermore, the water stress provoked by Turkey directly impacts the salinity of soils by decreasing Iraq's desalinization capacity (Shamout and Lahn 2015). Clearly, Iraq and Turkey must negotiate and implement sensible water management strategies in order to continue support of each country's citizens. However, the constant political turmoil in Iraq negatively affects Iraqi official's ability to negotiate water agreements.

How, then, did Iraq allow Turkey to continue with this development project? Especially

in light of the 1946 treaty between the two states, it seems implausible Iraq would allow Turkey to build these dams that negatively affect their water supply. The answer, of course, rests upon the political conflict within the region, specifically within the country of Iraq. During this time, the Iraqi government was in an incredibly unstable and transitory phase. This was also the time of the appearance of the Baathist party and the emergence of Saddam Hussein as ultimate president of Iraq. As such, quite simply, Iraq lacked any type of formidable power in which to dissuade Turkey or Syria from ceasing construction of dams or controlling water flow of the rivers. In addition to the perceived lack of power, Iraq also suffers from being the downstream recipient of the rivers. This factor makes Iraq an even less imposing figure in discussions resulting in Turkey and Syria easily disregarding Iraq's water wishes. For example, 1975 was a low flow year, but Turkey still withheld the same amount of water. Frustrated by Turkey's refusal to share the water, Iraq threatened violent military action and mobilize troops against Turkey. Despite this aggressive behavior from Iraq, Turkey did not respond until Saudi Arabia stepped in to mediate the crisis. Clearly, Iraq lacked the political power to negotiate with its neighbors (Glieck 1994; Wolf 1999).

In addition to political conflict within the international arena, the political climate within Iraq was also unstable and resulted in many water management strategies which continue to add to the water crisis currently facing Iraq. The best example of this conflict is the enormous conflict between the Sunni and Shia groups. In some cases, Saddam's regime disproportionately disenfranchised some groups of Sunni Muslims, and Saddam purposefully acted aggressively against Shia Muslims in order to exert dominance and weaken his political enemies.

Saddam's draining of the marshes in Southern Iraq provides a perfect example of

political conflict resulting in damages to water supply. While the draining of the marshes represents a complex study with many different explanatory factors, the general principles of the draining exhibit the affect of political conflict on water supply. As the first gulf war came to an end, a group of Shia Muslims in the marshes district revolted against Saddam's regime. In order to stifle this rebellion, Saddam decided to use water as a weapon against this political entity (Richardson and Hussain 2006). In a brutal effort, Saddam essentially destroyed the livelihood of many Shia Muslims by draining the marshes. Many of these Shia Muslims were involved in farming practices in the southern marshes. Not only did these marshes provide a livelihood for many Shia communities in that region, but the marshes represented historical landmarks and were considered some of the most diverse, fertile marshes in the world (Vidal 2013). Saddam cared for neither the historical or economical factors, and instead ordered the draining of the marshes. While this draining was an incredible engineering feat, it has had serious repercussions on both the Shia groups, the land, and the water supply (Lawler 2005).

In considering this case, a few things must be noted. First, the motivation for the drainage of the marshes was political and escalated political tensions; it will be a long time before the Shia groups forget Saddam (and therefore the Sunni) draining of the beloved marshes. Thus, it only escalated the conflict between the two groups (Simons 2016). Second, draining the marshes made the land essentially infertile: hardly anything grows in the region anymore and anything that does grow does not yield sufficient agricultural gains to be sustainable (Jeffrey and Achurch 2016). Third, while probably not an intended result of the draining of the marshes, the soil and the water have become incredibly saline. Salinization of soil and water sources pose significant threats to agricultural and potable water sources for the country. Thus, the draining of the

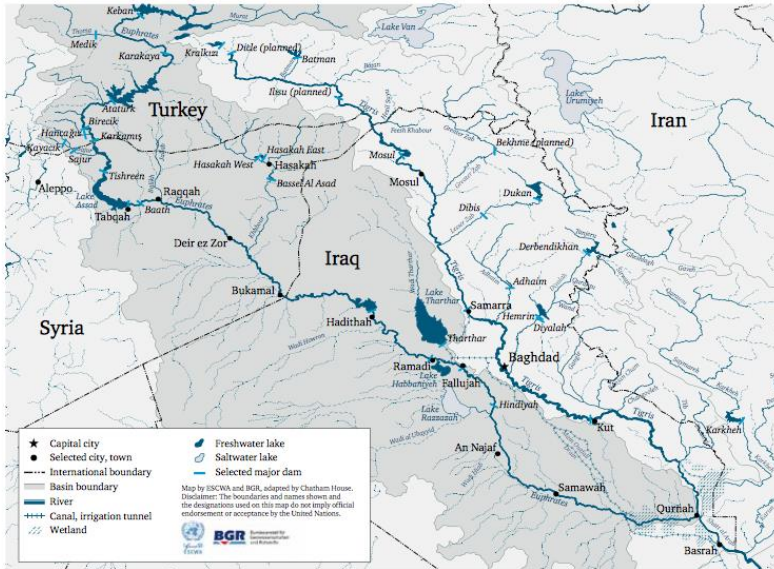
marshes effectually ruined the area for dozens of years and only contributes to current water crisis within Iraq (Richardson 2006). While attempts have been made to refill the marshes, extensive amounts of water are necessary to counteract the water salinity. Decreasing the salinity of the soil is even more difficult and requires even more water (Vidal 2013). However, due to GAP and the constructed dams along the river, the water supply has shrunk and, consequently, Iraq's water situation seems dire.

Yet it is important to note that these water shortages and crises result from conflict, but they are not the main sources for the conflict. In summary, one can easily see the political conflict in relation to Turkey's construction of many dams; these dams negatively impact the water supply in Iraq and exacerbate the water crises. Additionally, the political conflict within the country, as shown by Saddam draining huge swaths of marshes in Shia communities, led to salinization of water and soil and also contributed to the water crises.

#### *Political Conflict and Dams*

The political conflict within the region and within Iraq not only affected the water supply in the country, but it also affected the construction of dams within Iraq. Even though these dams were expensive and difficult to maintain, the political climate of Iraq (starting from the 1970s) encouraged the construction of dams regardless of the environmental or social impacts. In order to understand Iraq's dependence on the Tigris and Euphrates, one must understand the geography of the region. This map highlights the region's water supplies and indicates various large dams along the rivers. Note, all the main cities are located upon the shores of the Tigris and the Euphrates. Additionally, this maps shows Iraq's reliance on Syrian and Turkish cooperation for water supply. Specifically, is especially sensitive to the construction of dams, given that the

water flow from Euphrates travels from both Turkey and Syria before reaching Iraq. Most importantly, the map shows the different completed and planned dams for the region. As one can see, the southeastern part of Turkey is spotted with dams, and Iraq, feeling threatened, followed suit to construct dams (Damon 2061).



Source: UN ESCWA and BGR (2013), Inventory of Shared Water Resources in Western Asia, Beirut.

Although Iraq did construct and use dams for hydroelectric power, Saddam's regime also appears to have been motivated by international pressure from Turkey. In relation to political conflict within the Turkey-Syria-Iraq region, Saddam commissioned the construction

of multiple dams – perhaps as a way to show dominance and strength. While The conflict created a water crisis and the dams were, in part, a reaction to that water crisis (Al-Ansari et al 2015). Unfortunately, the poor management and construction of the dams only exacerbated the water crises as the Iraqi dams stifle water flow and threaten to breach at any moment.

The construction of the Mosul dam in 1984 highlights the role of political conflict in the construction of dams. While the large scale of the dam itself was not necessary, the subordinates to Saddam wanted to impress him and gain his favor. Indeed, the political situation effectually coerced anyone into doing things in the hopes of pleasing Saddam – or at least not angering him.

The tensions created by Saddam's regime were clearly a motivating factor behind the construction of the Mosul dam. Wanting to impress Saddam, members of his party suggested building one of the largest dams in the Middle East region and the largest in Iraq. They surveyed a variety of places for the dam and decided to construct the dam thirty miles north of the city of Mosul, near the village of Wana. After choosing this spot, Saddam insisted the dam be built there. Unfortunately, one key factor significantly impeded the continued success of the dam: the gypsum foundation.

Gypsum is a highly water soluble soil, and is thus not ideal for a dam location. The minerals from the water break down the gypsum, which means that the water held within the dam is continuously eroding the foundation and will result in eventual attrition of the dam. However, this would not deter the proponents of the dam because of the intense political conflict within the region. In order to make Saddam happy, the dam had to be completed in that spot. Some suggest Saddam required the dam built there in order to appease his support-base as most of the Wana constituents represented Sunni Arabs, a relatively loyal support based for Saddam (Collard 2016). Unfortunately, within one year of Mosul's opening, the dam's engineers found leaks along the foundation. As a result, essentially every day since the start of operations in 1985, Iraqi engineers work around the clock to inject over two tons of cement into the 1.2 mile long foundation of the Mosul dam. This intensive upkeep significantly increases the risk of the dam breaching, especially in times of military conflict as will be discussed later in the paper.

However, completion of dams was not the only result of political conflict within the region. In fact, many dams were left uncompleted due to the political conflict. Most notably, the UN sanctions devastated the economy and production within Iraq, leaving many projects left



unfinished. One such dam was the Badush dam directly downstream of the Mosul dam. It was created as a back up to the Mosul dam: in the case of Mosul breaching, the Iraqi government wanted the Badush dam to catch the excess water. Regrettably, the sanctions stripped Iraq of any economic possibility to finish the dams; thus, it was left unfinished as a relic of a more powerful past. It now stands empty and acts as an almost ominous premonition of the predicated emptying or breaching of the Mosul dam.

It is evident these dams were not created out of a need to conserve water or due to water tensions. Instead, the dams were chiefly created in order to generate electricity for the Iraqi people. For this purpose, they were moderately successful in that the dams generated nearly 50% of electrical power for Iraq. However, following the bombing attacks in 1991, the efficiency of the dams decreased dramatically, and the dams never returned to their prior level of efficiency (International Study Team 1991). Hence, the Iraqi government created and abandoned the dams due to the political conflict within the region, both internationally and domestically. Unfortunately, that political conflict made the dams unstable and dangerous for all of Iraq and significantly contributed to the current water crisis in Iraq.

#### *Military Conflict and Water Shortage*

The military conflict in Iraq also played a significant role in the current Iraqi water crisis. On the most basic level, military conflict merely distracted politicians from focusing on passing water rights laws or regulations regarding water usage (Salih 2016). As a result, poor forms of irrigation were used, and the general Iraqi population used a rather large share of water (Shamout and Lahn 2015). Government officials could regulate water use, but the political elites were consistently too preoccupied with the military conflicts within the region to be concerned about

water management. Unfortunately, disregarding such vital resource such as water leaves a lasting impact upon the environment and the water supply, which are often not felt until years later.

Such was the case in Iraq.

The leaders of Iraq focused on the Kuwait War, the Iran War, the Gulf War, the U.S invasion in 2003, the Iraqi civil war, and the current conflict with ISIS rather than focus on water management. However, this continuous distraction does not mean the government completely neglected water management. In fact, the Iraqi government did pass a number of regulatory water laws (Salih and Razhan 2016), yet these laws were insufficient to quell the growing problem of water shortages. As such, the water supply in Iraq remains depleted and contaminated.

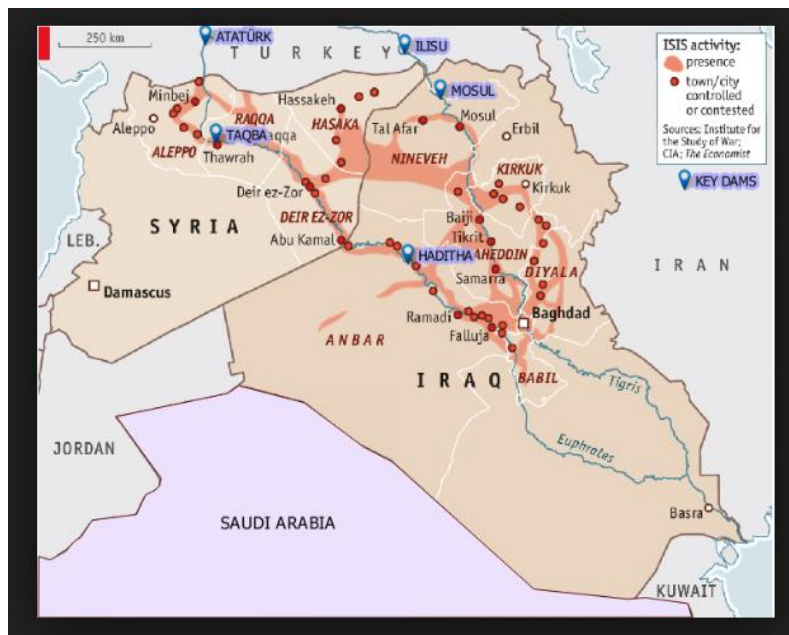
In addition to the indirect effects of neglect, military conflict directly impacted water quality and quantity. The continual fighting within Iraq undoubtedly affected the infrastructure of cities and isolated rural communities. In 1981, Iran allegedly bombed a few key water facilities in Kurdistan, and during the entire Iran-Iraq war, Iran consistently flooded Iraqi defenses in the southeastern corner of Iraq (Glieck 1993; Plant 1995). Both of these acts of aggression significantly affected the water in each area: the Kurdish villages lost power and the area surrounding the Iraqi defenses become inundated. Following the Iran-Iraq war, Turkey and the UN considered closing the Ataturk dam in southeastern Turkey in order to further punish Saddam for the continued conflict (Gleick 1993). Of course, this political move would have been highly aggressive and would have substantially stressed the water situation. While the UN eventually rejected this act, the UN sanctions proved detrimental enough to water in Iraq as discussed in later sections.

Using water in military conflicts extended also to the United States. During the first gulf war, the United States forces intentionally and unintentionally targeted water treatment facilities (Glieck 1993). The forces damaged dozens of treatment plants and sewage consequently flowed directly into the Tigris river (Arbuthnot 2000). Not only did the contamination pose huge environmental concerns, the public health concerns reached dangerous levels: infant mortality skyrocketed to 92.7 per 1000 live births, and children deaths related to contamination reached nearly 50,000 (Barrett 2003). The 2003-US led invasion also affected water treatment facilities. In fact, access to potable water significantly decreased. Approximately 51-70% of Iraqis lack access to potable water; hence, many people continue to drink contaminated water, which further exacerbates high level of disease and waterborne illness (Glieck 1998; Rawaf et al 2014). Additionally, farming also suffered losses. Due to military conflicts occurring on farmlands and the surrounding water sources, farming became futile: farmers were unable to use the lands and the land and water had become contaminated (Rawaf et al 2014).

Furthermore, Saddam Hussein often intentionally engaged in certain, dangerous military behaviors that indirectly negatively impacted the quality of water in his own country. He often used chemical warfare against his enemies, most notably the Kurds in northern Iraq (Kelly 2008). By using chemical warfare, he killed not only the people but severely contaminated the soil in those regions (O'Leary 2002). Effects from this chemical warfare are still seen in the Kurdish population, and the chemicals have saturated the soils. Due to runoff and contamination of groundwater, this military conflict thus indirectly affected the water quality, and it explains, in part, the high prevalence of non-potable water in the region (Kelly et al 2004). Therefore, the link between military conflict and direct impacts upon water quality are increasingly obvious.

## *Military Conflict and Dam Breaching*

As shown from the preceding section, regimes have consistently used water as military target or tool, which resulted negative situations for water quality. However, regimes targeting and threatening the breach of dams has been a relatively recent development. In fact, the emergence of ISIS as a military actor within the Turkey-Syria-Iraq region led to a new type of warfare regarding water. It is obvious that a civilization or group of people needs water to survive. Not only does it provide sustenance for life, but it also allows a group to travel easily and irrigate farms. In arid regions, it becomes crucial to control water sources. Therefore, ISIS



predictably seeks to control strong water points throughout Turkey, Syria, and Iraq. As shown in the map, ISIS's alleged territory and presence essentially follows the routes of the rivers, and they have, unfortunately, gained control of some key dams.

While the territorial grab of water-rich land is unsurprising, the use of water as a weapon does raise significant concerns. Prior to 2010, military parties essentially never used dams as a military tool, and they most certainly did not threaten to breach the dams. However, in 2012, Syrian rebels gained control of the Tishrin dam in Northern Syria. While the rebels did not use it as a military weapon, they did use it as a military tool to exert dominance (Mroue 2012), and this

use of a dam as a military tool seemed to inspire a new generation of warfare in the Middle East. Following the capture of the Tishirin dam, the regimes began to target water sources, and ISIS specifically began to vie for control of large dams. Unfortunately, ISIS has been moderately successful in holding dams. In Syria, ISIS controls the Tabqa dam, which provides water and power to millions of Syrians. The threats by ISIS to lace the dam with dynamite and explode it frightened many people, especially those living within close distance to the dam (Paletta 2016). Thus, ISIS effectually created a new tool for terror: water.

Although ISIS currently chooses not to blow up the Tabqa dam, ISIS's intentions remain unpredictable, and thus the threat remains eminent. Additionally, this new method for warfare poses significant problems to the breaching of dams within Iraq and the overall water crisis facing Iraq. Following the Syrian rebel's capture of the Tishirin dam, ISIS began to target dams within Iraq. In 2014, ISIS made a concentrated effort to the Hadith and Mosul dams – two key dams in Iraq. Regrettably, ISIS briefly gained control of both dams in mid-2014 (Rubin and Nordland 2014; Maler 2014; Krieter 2014). The controlling forces of these dams effectually have control of both the Euphrates and Tigris rivers as the dams are located on the northern sections of each river, respectively. Fortunately, a U.S led coalition successfully counter-attacked, and the Iraqi forces regained control of both the dams (BBC News 2014; Barnes 2014). However, significant damage had already been done, and the effects of this military conflict poses significant concerns regarding the breaching of dams.

First, with ISIS focusing on water sources as targets, the water supply will undoubtedly be affected. If they gain control of more dams, they will be able to control the amount of water released and the rate of the release. This would have lasting implications on water availability

and consequently irrigation and agricultural practices would be adversely affected. Additionally, controlling forces of dams could also control the power and electricity as many of the dams serve hydroelectric purposes (JS 2014; Vidal 2014). Second, and most importantly, the control of dams by ISIS or any military force will increase the probability of a dam breaching mainly due to the neglect of the military group.

The Mosul dam acts as an excellent case study for this type of threat. As stated previously, the Mosul dam was built on gypsum soil and, consequently, requires daily maintenance in order to preserve the integrity of the dam (Collard 2016). However, during the attacks on Mosul during August 2014, ISIS gained control of the dam for ten days. During those ten days, ISIS did not have the sufficient means or will power to maintain the integrity of the structure. As a result, the leaks and cracks in the foundation of the dam grew without any supervision (Collard 2016). Additionally, the 300 employees for the dam fled at the presence of ISIS and did not return to work despite the victory of Iraqi troops. Therefore, for the past two years, the dam has not had the regular maintenance it has enjoyed for the past thirty years. While the Iraqi government is doing all it can to preserve the dam, the United States and other source view the breaching of Mosul dam as a larger threat than any other entity (Alwash 2016; Embassy of the United States 2016). One only has to look at the potential effects of the breaking of the dam to understand the fear related to the breaching of the dam. Not only would it inundate the city of Mosul, but it would extend into farmlands and other areas of Iraq (Borger 2016; Alwash 2016). It would also pose significant humanitarian crises, such as ones faced in the United States during the breach of the Johnston Dam in 1889 (Johnson 1889), and it would be a perfect culmination of all the water crises currently facing Iraq. Thus, it is easy to see the direct military

impacts upon the breaching of dams and the current water crisis in Iraq.

### **Alternative Explanations and Conclusion**

As shown through careful analysis, both political and military conflicts affect the water supply and threats of dams breaching. Nevertheless, it would be unwise to disregard other theories regarding water conflict. Many sources point to environmental factors such as climate change and soil quality as the key indicators of the water crisis: as global warming increases, water sources are estimated to decrease. However, other arid regions similar to Iraq do not currently face the same magnitude of water supply crisis despite warming temperatures. Additionally, environmental factors cannot fully explain the imminent threat of dams breaching. Thus, other explanations may be more appropriate.

Economic factors potentially explain the water crisis occurring in Iraq. The UN sanctions and other economically crippling events severely limited the government's ability to invest in infrastructure and consequently, water supplies decreased and contamination increased. The lack of funds also directly affects the ability to construct and finish high quality dams, which thus directly increase the risk of dams breaching. However, while economic factors surely explain, in part, the inability to complete or erect water treatment facilities and dams, they do not adequately explain the failure of Iraq's government to invest in those facilities. Money, clearly, is an issue, but other similarly poor regions such as Latin American and the Caribbean invested 20,996 million USD into sewage treatment facilities during 1990 to 2004. In stark contrast, the Middle East and North Africa region only invested 237 million USD during the same period (World Bank 2006). Thus, despite economic restraints, some regions still place a priority on clean water. Iraq clearly did not. Hence, economic factors cannot fully explain the current water crisis within

Iraq.

Additionally, others view conflict as merely a distracting factor, with water crisis occurring as an unwanted side effect. Ultimately, however, these theories all disregard the direct impacts of military and political conflict on the water. These theories fail to provide a holistic approach to the problem and miss vital causal links to the main outcome of water crisis in Iraq.

In conclusion, Iraq currently faces an enormous water crisis. Water supplies are shrinking, water is increasingly contaminated, and the population of Iraq continually endures the imminent threat of dams breaching. This consistent decrease in water supply and impending threat of breached dams puts an unneeded stress upon the government. Yet, all of these crises stem directly from the political and military conflict, which occurred between 1970 and the present; therefore, by understanding the political and military factors associated with the water crisis, the government can potentially implement certain policies to ameliorate the situation.



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