# The Islamic State: Syria, Iraq, and Water Resources

**How has water scarcity in Iraq and Syria contributed to the Islamic State uprising?**

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**Abstract**

In recent months, a Sunni Muslim insurgent group has surprised the world with a wave of complex military victories as it attempts to establish an “Islamic State” across Iraq and Syria. It was unexpected to outsiders who viewed the Islamic State as yet another anarchic and obsolete terrorist group. However, the rebels have shown astounding levels of sophistication and strategy as they swiftly capture targets along the Tigris and Euphrates Rivers. What distinguishes the rebels of the Islamic State is their keen awareness of how water resources shape the lives of all Syrians and Iraqis – past and present. If policymakers wish to understand or outmaneuver these insurgents, they have to be just as aware of the real power that water resources hold in the Middle East. This paper discusses how water scarcity contributed to the instability in Iraq as well as the civil war in Syria, and how the Islamic State has since used water to exploit the chaos.

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**PUTTING THE HOSTILITIES INTO CONTEXT**

For decades, outside nations quietly viewed the leadership in Iraq with disapproval. It was obvious that the powerful Sunni Muslim minority ruled Iraq and subjected the majority Shia Muslim population to systematic discrimination. Many predicted that the Shia would one day rise up against the Sunni in retaliation[2]. The Sunni who controlled Iraq (e.g. President Saddam Husain) tended to come from wealthier and more exclusive areas of the country. Conversely, most of the Shia resided in the southern parts of Iraq, which also happened to be the most economically depressed areas[3]. While Sunni Muslims enjoyed top-paying government and security positions, Shia Muslims had little to subsist on. To many onlookers – even decades ago – it appeared that violent conflict in Iraq was inevitable.

The political climate in Syria paralleled the one in Iraq even though circumstances of the two regimes were different. A minority party also ruled Syria; but they identified themselves under a socialist movement called *Ba'athism*. For decades, the small Ba'ath party ruled Syria and its Sunni Muslim population, which – like in Iraq – inexorably built up a certain level of discontent among the common people. For decades, the Ba'athist party ruled Syria with an authoritarian "iron fist. Today, the party is led by Bashar al-Assad, who came to power after the death of his father, Hafez al-Assad. Like his father, Bashar ruled absolutely: he claimed that his people were given the freedom to run their private lives as they wished so long as they never challenged his authority.

The theory used most often to explain the rise of recent violent conflict in both Iraq and Syria is that it was the product of decades of sectarian oppression. After years of being ruled by leaders who did not share their priorities – or even persecuted them – the masses finally decided to viciously exact their revenge. While somewhat true, this simple picture does not give the whole story.

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[1] Ashkenas, Jeremy, Archie Tse, Derek Watkins, and Karen Yourish. "A Rogue State Along Two Rivers." *The New York Times*. The New York Times, 02 July 2014. Web. 30 July. 2014.

[2] Chapin, Helen. "Iraq - Sunni-Shia Relations in Iraq." *Iraq - Sunni-Shia Relations in Iraq*. Washington: GPO for the Library of Congress, 1988. Web. 01 Aug. 2014.

[3] Chapin

History, even modern history, is littered with despots who reigned cruelly without disturbance from their subjects. In countless places around the world, people with different backgrounds live harmoniously. Cultural distinctions, religious differences, or ethnic diversity may sharpen disagreements, but these factors do not alone determine why these differences become *violent*. In fact, both Syria and Iraq have a long legacy of ethnic and religious diversity. It would be a mistake, therefore, to label the uprisings in Iraq and Syria as merely a struggle between religious sects. It is common for dissimilar groups to dispute, but the escalation of such quarrels into lethal violence cannot be explained simply by referencing a particular social background. To label a conflict simply as an ethnic war can lead to misguided policy choices by fostering a wrong impression that ethnic, cultural, or religious differences must be suppressed in order to achieve peace[4]. In other words, simplifying any violent conflict into terms of ethnic differences may spread the idea that peace necessitates *homogeneity* – a dangerous concept.

According to the Carnegie Commission on Preventing Deadly Conflict: "…the words "ethnic," "religious," "tribal," or "factional" – important as they may be in intergroup conflict – do not, in most cases, adequately explain why people use massive *violence* to achieve their goals"[5]. Furthermore, though tensions certainly existed for years under Iraqi Sunni leadership, the theory that deadly conflict was caused by Sunni-Shia friction falls apart under closer examination. For example, when Iran (a Shia nation) invaded Iraq in 1982, the Iraqi Shia rose up and fought alongside the Iraqi Sunni *against* the Iranians, even though the Iranians declared that they were trying to help build an all-Shia Islamic State[6]. It seemed that in Iraq, nationalism was more important to the people than their sectarian affiliation. As for Syria – under the rule of the two Assads, the nation made significant commercial progress. Just before the current civil war broke out, income per capita in Syria was comparable to Jordan and roughly twice as much as in Pakistan or Yemen[7]. Though the people may have disagreed with al-Assad leadership, at least they were financially stable.

Thus, while the sectarian past of both Iraq and Syria is vitally important to understanding popular dissension, it is not the sole reason the situation recently led to mass violence and the rise of extreme insurgent control. What happened during the Arab Spring across the entire Middle East was a mix of social, economic and environmental factors. If future leaders in Iraq and Syria, as well as the international community, hope to resolve the current uprisings then the conditions that created them must be better explored and understood. This paper looks at one factor – water scarcity – that is often unnoticed, and applies it to the current rise of the Islamic State.

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[4] Carnegie Commission on Preventing Deadly Conflict, *Preventing Deadly Conflict: Final Report with Executive Summary*. Washington, DC: Carnegie Corporation of New York, 1997. Print.

[5] Carnegie Commission

[6] Chapin

[7] Polk, William R. "Understanding Syria: From Pre-Civil War to Post-Assad." *The Atlantic*. Atlantic Media Company, 10 Dec. 2013. Web. 30 July 2014.

## A Legacy of Water Scarcity

The illustrious history of Iraq – one of the world's earliest and most advanced civilizations – arose from its mastery of hydrologic resources. Archaeologists believe that by about 500 A.D., the nation's advanced irrigation systems reached its peak: the Iraqi people had pioneered groundbreaking techniques of controlling the region's waters[8]. However, by the early twentieth century, the revolutionary infrastructure of its early civilization had severely degraded and Iraq had to concentrate anew on the restoration of its water infrastructure. The regimes of this time period commissioned large dams, irrigation systems, flood control projects, and drainage networks, in the hopes of one day possessing state-of-the-art water systems across the country.

Syria, too, has a rich chronicle of hydrologic innovations. Back in the Roman era (1st century A.D.) Syrians used sub-surface aqueduct system called *Qanats* that allowed groundwater to flow uninterrupted throughout the year, which provided farming irrigation for centuries[9]. As demand exploded at the turn of the 20th century, novel technologies for tapping deeper and deeper aquifers were introduced. Even with the application of modern technologies, however, the harsh, arid climate of the Middle East made farming a difficult endeavor. Since ancient times, the people of the Mesopotamian region have relied on the waters of the Tigris and Euphrates Rivers as the foundation for successful agriculture.

The Tigris and the Euphrates rivers form a widespread hydrologic network that originates in Turkey and culminates in the Persian Gulf. Since they naturally form the largest source of potable and agricultural water in the region, the three major users –Turkey, Syria and Iraq – are determined to maximize their share of its resources. Large hydrologic projects have been commissioned over decades in an attempt to control the flows of the rivers, which are extremely variable, from disastrous floods to crippling droughts. In the Euphrates, for example, flow rates have been recorded from as little as 180 to as much as 5,200 cubic meters per second[10].

Water quality, as well as quantity, has been a major concern among these nations. The adverse effects to the quality of the Euphrates, for example, were mostly due to irrigation return flows containing high concentrations of chemicals and salts[11]. Especially for Iraq – the most downstream nation – loss of agricultural land to the effects of salinization has been increasingly worrisome. Approximately 20% of Iraq is farmland, which was sustained by rain in the mountain valleys and the rest was irrigated from the Tigris and Euphrates waters[12]. The high-salinity, alluvial soil in Iraq posed challenges for agricultural efforts. Silt deposited by the Tigris and Euphrates during times of flooding

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[8] Chapin
[9] Firedman
[10] Chapin
[11] Friedman, Thomas L. "WikiLeaks, Drought and Syria." *The New York Times*. The New York Times, 21 Jan. 2014. Web. 15 July 2014.
[12] Polk

would render huge regions of farmland sterile. In addition, the area's flat terrain makes it highly susceptible to flooding and difficult to build drainage systems on.

One of Iraq's biggest water scarcity challenges has been its downstream location from both Syria and Turkey on the Euphrates[13]. Large dams constructed in the 1970's by Turkey and Syria caused protests from Iraqi civilians as the amount of water entering their country sharply dropped[14]. Since 1975, Turkey's dam and hydropower constructions on the two rivers have cut water flow to Iraq by 80 percent and to Syria by 40 percent[15]. Both Syria and Iraq have accused Turkey of hoarding water and threatening their water supply. For Syria, one of the major problems has been its extremely high population growth rate, which has strained its water resources to the brink[16]. Syria's high level of population growth complicates the problem of water scarcity enough on its own; however, it has been exacerbated by the millions of Iraqi refugees it has struggled to accommodate since the American Occupation of 2003. Despite the significant costs of supporting approximately 1.2 million Iraqi refugees, Syrians offered persistent support to their displaced neighbors[17]. What's more, these refugees were experiencing further hardships as the United Nations reported that approximately 85% of those who were displaced into Syria did not see permanent return to Iraq a feasible option any time soon because of security.

[13] Polk
[14] Ashkenas
[15] Ashkenas
[16] Polk
[17] Friedman

**Table 1: Outline of Major Water-Related Military Events in Iraq and Syria**[18, 19]

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| 1974 | Iraq claimed that the Syrian dam had reduced flow of water in the Euphrates. Iraq threatened to bomb it and marshaled troops along the border. |
| 1975 | Tensions rose when Iraq formally protested to the Arab League that Syria was intentionally reducing flows to intolerably low levels. Iraq threatened to take any action necessary to ensure they received their share of the Euphrates' flow. |
| 1980s | Saddam Hussein drained 90% of the Mesopotamian marshes in order to punish the Shia who rose up against him. |
| 1991 | Allied forces destroyed Iraq's water supply system during the Persian Gulf War. At least 31 municipal water facilities were destroyed and as a result, filled the Tigris with sewage. Subsequently, 47,000 children died within the first eight months of 1991. |
| 2003 | Soon after the beginning of the Iraq War in March 2003, insurgents bombed a six-foot wide water pipeline in Baghdad. |
| 2003 | During the Invasion of Iraq, dams were major military objectives of U.S. forces. Direct targets included large parts of the water distribution system, especially in Baghdad. |
| 2003 | Jordanian authorities foiled a plot by Iraqis to poison the water tank serving American troops stationed on the Iraq border. |
| 2008 | American diplomats in Syria warn that the number of drought-related migrants fleeing into cities "could act as a multiplier on social and economic pressures already at play and undermine stability in Syria". |
| 2011 | Political unrest begins in Dara'a and quickly escalates into civil war as Syrian rebels seek to remove the Ba'ath Party from power. |
| 2012 | The major pipeline delivering water to the city of Aleppo, Syria is critically damaged. The city's three million residents are cut off from their drinking water supply. |
| 2012 | In November, Syrian rebels overrun governmental forces and capture the Tishrin hydroelectric dam on the Euphrates River. The dam is a major hydroelectric supplier and strategically important to the Syrian regime. |

[18] Gleick, Peter H. "Water, War & Peace in the Middle East." *Environment: Science and Policy for Sustainable Development* 36.3 (1994): 6-42. *ATMOS*. Global Environment Program of the Pacific Institute, 1994. Web. 30 July 2014.

[19] Ashkenas

## How Drought Bred Instability

Droughts are common phenomena in Syria and Iraq – lands considered to be the breadbasket of the Fertile Crescent – but up until recently, water management technologies have been sufficient to respond to conditions in times of scarcity. After four consecutive years of extreme drought from 2006 to 2010 – in addition to devastating dust storms, extreme temperatures and debilitating salinization – Syria and Iraq are shifting towards complete sterility[20].

In 1985, Syria had 651,000 hectares of irrigated land[21]. By 2010, that number skyrocketed to 1.35 million hectares[22]. Water demand for irrigation quickly outstripped supply. In 2007, the total available water resources in Syria were approximately 15.6 billion cubic meters while the total water withdrawal that year was over 19.2 billion cubic meters[23]. Syria made up for the discrepancy using water from dam reservoirs and groundwater aquifers. Groundwater resources are particularly precious in this region, but the extracted resources were predominantly wasted since the government pushed to grow crops using highly inefficient irrigation methods.

The typical method of irrigation in Syria was to use archaic flooding techniques, which are known to waste up to 60 percent of the water to evaporation[24]. At a time when water scarcity and population growth were both skyrocketing, the reckless water management strategy of the Assad regime could not have been more detrimental. The Syrian government pushed to expand agricultural projects even in the face of regional drought, probably because of two leading factors. First, Syria faced an exploding population that it had to feed; and second, the Assad regime desired agricultural self-sufficiency. Even in the face of an enormous water deficit, official policy of the government was to expand irrigation zones through enormous land reclamation projects throughout Syria[25].

Between the years of 2006 and 2010, the crippling drought in Syria destroyed the fertility of its lands; turning nearly 60% of the country was turned into desert[26]. The Fertile Crescent could no longer support agriculture. Consequently, 80% of cattle and other grazing animals died in Syria by 2009[27]. Farmers and their families fled the barren fields in

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[20] Famiglietti, Jay. "The Middle East Lost a Dead Sea-Size Amount of Water in 7 Years." *National Geographic*. University of California, Irvine, 22 Feb. 2013. Web. 8 July 2014.

[21] Châtel, Francesca De. "The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution." *Middle Eastern Studies*. Routledge, 27 Jan. 2014. Web. 30 July 2014.

[22] Châtel

[23] Châtel

[24] Friedman

[25] Châtel

[26] NPR. "How Could A Drought Spark A Civil War?" *NPR*. National Public Radio, 18 Sept. 2013. Web. 01 Aug. 2014.

[27] Polk

masses of hundreds of thousands.

According to the International Federation of Red Cross and Red Crescent (IFRC) Societies, between 2002 and 2008 Syria's total water resources dropped by half.[28] In 2009, the IFRC gave warning on the extent of the drought in Syria in an Operations Report that declared the three years of water scarcity had devastated the lives of 800,000 Syrians, whose income had decreased by 90 percent[29]. The drought of 2006-2010 in Syria was estimated to have directly impacted over 1.3 million people, according to the Syrian Ministry of Agriculture[30]. The United Nations estimated that the four-year drought pushed 2-3 million Syrians levels of extreme poverty. Just before the IFRC Report was released, the United Nations Food and Agriculture Organization made a chilling forecast, warning that Syria faced complete "social destruction" because the economic and social fallout from the drought was beyond the country's ability to recover from[31].

The danger of water scarcity in Iraq was perhaps even more visible than it was in Syria. In 1995, safe water supplies were reaching over 96% of urban areas and 48% of rural areas, and Iraq's overall sanitation level was fair[32]. However, as part of the Occupation of Iraq in 2003, a major strategy of the United States was to destroy power and water facilities. As part of this military tactic; pumping stations, sewage facilities, canals, dams, and water desalination plants, were all bombed. The result of this was the severe destruction of Iraq's water distribution infrastructure, as well as causing energy shortages that prevented operation of the remaining water treatment plants. One year after the American Occupation began; the proportion of Iraqis with access to safe drinking water had severely diminished from its Saddam years. The American Occupation, which followed years of crippling sanctions, made returning water facilities back to normal a long process. Since the end of the Occupation, projects funded by agencies such as USAID, UNICEF, WFO, the World Bank and other NGOs, attempted to rebuild these facilities and begin to restore basic water and sanitation services. However, when the unprecedented drought of 2006-2010 rocked Iraq, the barely recuperated country was even less prepared to handle the drought's consequences than neighboring Syria. According to its Ministry of Water Resources, only 32 percent of the Iraqi population has access to clean drinking water, and only 19 percent has access to a good sewage system. Anbar province (where Fallujah is located) and Baghdad soon became the most affected areas for water supply[33].

The collapse of the region's agricultural resources can be attributed to human mismanagement as much as to drought. Between 1988 and 2008, the Syrian government

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[28] Aysan, Yasemin. "Emergency Appeal MDRSY002." *Syria: Population Displaced from Iraq* (n.d.): n. pag. *Syria: Population Displaced from Iraq*. IFRC, 17 Dec. 2009. Web. 28 July 2014

[29] Aysan

[30] Friedman

[31] NPR

[32] Aysan

[33] Holthaus, Eric. "Is Climate Change Destabilizing Iraq?" *Slate Magazine*. Graham Holdings, 27 June 2014. Web. 15 July 2014.

spent $15 billion on imprudent irrigation projects[34]. These investments in water-wasting schemes only served to compound the scarcity that is being felt today[35]. Syrian agricultural policies have been widely criticized as "wasteful" because of high government subsidies on wheat and cotton farming. These two crops are highly water-intensive and typically use inefficient irrigation techniques, compared to other crops that could have been encouraged throughout the country. Syria continued to try and grow cotton and wheat in areas that didn't have enough water to justify doing so because of large global profit margins. The Assad regime's promotion of growing wheat meant that in 2006, when global prices were high, Syria was able to sell its wheat reserves for great profit[36]. However, when the drought years hit soon after, the country was forced to *import* large amounts of wheat. Lured by the high price of the crop on the world market in 2006, it had sold all of its strategic reserves. According to the U.S. Department of Agriculture, in 2008, and for the rest of the drought years, Syria had to import enough wheat to keep its citizens alive. After the fact, it was clear that by heavily subsidizing water-intensive crops, promoting inefficient irrigation techniques, and over pumping groundwater aquifers, the government had fatally abused the country's most precious resources[37].

The effects these abuses on water resources became obvious by the end of the decade. In the face of increasing water scarcity, more and more illegal wells were drilled in order to reach deeper groundwater aquifers. This trend continued to occur despite a 2005 law against drilling wells. Soon, the scarcity was felt in cities just as painfully as it was in remote farming communities. Urban water supplies were strained beyond sustainability when hundreds of thousands of people migrated from drought-affected rural areas. The lack of water led to an extreme exodus of farmers and herders into the cities. In June 2009, the Syrian government reported that in Al Hassakeh alone, the inhabitants of approximately 36,000 households had migrated to urban Damascus, Dara'a and Aleppo because of the water scarcity[38]. In the eastern areas making up the granary for the entirety of Syria (Al Hassakeh, Deir az Zor, Raqqah, Homs and Hama) the drought impacted almost the entire population[39]. According to a case study from the Global Assessment Report on Disaster Risk Reduction, nearly 75% of the most vulnerable Syrians (those dependent on agriculture) suffered total crop failure and herders lost over 85% of their livestock. Desertification forced farmers and herders to move elsewhere, starve, or demand change[40].

By 2011, the Global Assessment Report estimated that a million Syrians were left extremely "food insecure" by the droughts. In the farming areas around the city of Aleppo

[34] Polk
[35] Worth, Robert F. "Earth Is Parched Where Syrian Farms Thrive." *The Middle East*. The New York Times, 13 Oct. 2013. Web. 28
[36] Friedman
[37] Femia
[38] Aysan
[39] Aysan
[40] Femia

alone, over 200,000 agriculturally dependent villagers were forced to migrate into the cities [41]. These internal migrants lost their homes, savings and livelihoods *before* the civil war had even begun. The refugees fled to the cities where they hoped to escape the water shortage and find new jobs. In turn, these large numbers of internally displaced people became the most vulnerable groups to water shortages, since they typically resorted to drinking from rivers or even puddles. Since 2006, the number of cases of diarrhea in Iraq among adults increased by 40 percent among adults and 70 percent among children[42]. According to the Red Crescent, drinking contaminated surface waters caused at least 95 percent of these diarrheal cases [43].

### Civil War

The origin of the Syrian uprising is generally considered to have originated in the small city of Dara'a, back in the February of 2011. Citizens fled dried-up rural areas and migrated to the cities in the hopes of getting new jobs. However, rather than finding help or employment, their situation only degenerated as the Assad regime made no move to alleviate or even acknowledge their trouble. Unemployed, homeless and ignored, the stagnation created a breeding ground for discontent among the former farmers. The enormous level of internal displacement into urban centers, and the discontent felt among those rural communities, is an often-overlooked factor of the social and political upheaval of Syria[44]. The refugees looked around in anger – the people felt that they were being discriminated against, perhaps because of their sect. Their suspicions were solidified when the government began awarding the right to drill wells for water on a sectarian basis[45]. When people became desperate they dug illegal wells, which became a seditious act against the regime[46].

A small group gathered in Dara'a in the early months of 2011 to protest against the regime's indifference to their plight. Rather than hearing their complaints, however, Bashar al-Assad saw them as subversives and sought to restore order via his military. According to some analysts, the army had been frustrated from years of inaction and humiliating losses to Israel, and so they took their aggravation out by responded brutally to the rebels. This caused a cyclical exacerbation of the conflict as more riots broke out across the country and were met with harsher and harsher military responses. Thus, what had started as an issue of rural poverty gradually transformed into a political, ethnic and religious cause.

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[41] Femia
[42] Aysan
[43] Aysan
[44] Femia, Francesco, and Caitlin Werrell. "Syria: Climate Change, Drought and Social Unrest." *The Center for Climate Security*. The Sustainable Markets Foundation, 3 Sept. 2013. Web. 08 July 2014.
[45] NPR
[46] NPR

**THE RISE OF THE ISLAMIC STATE:**

The rural masses in Iraq and Syria had lost their livelihoods and homes and felt that the government was ignoring them, so they loudly demanded change. The chaos provided ample opportunity for a number of insurgent groups to thrive: the most successful of these has been the Islamic State.

In April 2013, a group of rebels broke away from al-Qaeda in Iraq (AQI) to create the Islamic State, formerly known as the Islamic State of Iraq and al-Sham (ISIS). A battlefield commander by the name of Abu Bakr al-Baghdadi leads the group of Sunni insurgents. The Islamic State aims to take out the Shia populations in Iraq and Syria and establish a new, all-Sunni nation. A major priority for the group then, is to put pressure on the Shia government in Baghdad and Ba'ath regime in Damascus by any means necessary[47]. A key strategy of the Islamic State so far has been to control key water targets in Iraq and Syria. In an arid region that frequently experiences severe water shortages- rivers, canals, dams, sewage and desalination plants have all become military objectives.[48] Control over the water supply is just as important (or arguably more than) control over oil refineries. Especially in the summer, cutting of water would cause an even greater health crisis – increasing the rates of famine, malnutrition, disease, and migration – relentlessly feeding internal instabilities[49].

The militant group quickly surprised global officials with its surge of victories, which were made by cleverly maneuvering along the Tigris and Euphrates. After first establishing bases in Syria and Anbar, the insurgents turned to northern Iraq. Soon after, the insurgents captured Mosul, Iraq's second-largest city. Mosul was a key commercial and economic center, giving the Islamic State a foundation for a rapid series of attacks heading south along the Tigris towards Baghdad. In Iraq, the Islamic state has declared its intention to use the strategic Mosul dam to deprive the southern Shia regions of water[50]. United States Intelligence Officer Jennifer Dyer affirmed that "If [the Islamic State] has any hope of establishing itself on territory, it has to control some water. In arid Iraq, water and lines of strategic approach are the same thing"[51].

[47] Svensson, Birgit. "Water as an Instrument of War." *Qantara*. German Foreign Office, 13 June 2014. Web. 09 July 2014.
[48] Vidal, John. "Water Supply Key to Outcome of Conflicts in Iraq and Syria, Experts Warn." *The Guardian*. Guardian News and Media, 03 July 2014. Web. 08 July 2014.
[49] Vidal
[50] Holthaus
[51] Vidal

**THE HADITHA DAM:**

The Haditha is the second largest dam in Iraq, located on the Euphrates River. It delivers hydroelectric power to much of Iraq and thus provides great leverage over Baghdad.[52] Once in control, the Sunni terrorist organization will have the power to stop the Euphrates' flow to all of southern Iraq (which is predominantly Shia)[53]. The dam's security has concerned U.S. officials for years and protecting it was one of the first objectives of the American Special Forces invading Iraq in 2003[54]. Americans were afraid that Saddam would release the dam's flow, effectively turning the structure into a weapon of mass destruction as it released billions of gallons of water to the surrounding areas. In 2005, rebels attacked Haditha twice with explosive devices but did not cause major damage[55]. As U.S. troops departed Iraq, Haditha's safety became increasingly worrisome. A 2009 assessment by the Special Inspector General for Iraq Reconstruction (SIGIR) found that a $1 million American effort to boost security at the site was inadequate[56]. For example, a chain-link perimeter fence surrounding Haditha was badly constructed and had already deteriorated[57].

A compromised Haditha Dam remains a serious threat to western and southern Iraq. The Islamic State could use it to cause major flooding downstream and critically affect the functioning of the country's electrical grid, cutting off power to Baghdad[58]. When the Islamic State owns both the Mosul and Haditha Dams, the group will control the main water sources for 32 million Iraqi citizens[59].

**NUAIMIYAH DAM**:

The Nuaimiyah is a smaller dam on the Euphrates near Fallujah that was captured by the Islamic State in April 2014. Soon after, the Islamic State closed the floodgates and left ten million people without water[60]. The move had two consequences: it deprived the cities of Karbala, Najaf, Babylon and Nasiriyah of water while simultaneously flooding the town of Abu Ghraib (the site of the infamous prison) and its villages (over 200 square miles). According to the United Nations, approximately 12,000 families lost their homes from the flooding of this small dam[61].

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[52] Vidal
[53] Bender, Jeremy. "ISIS Is Closing In On Iraq's Most Important Dam." *Business Insider*. Business Insider, Inc, 25 June 2014. Web. 04 July 2014.
[54] Johnson
[55] Johnson
[56] Johnson
[57] Johnson
[58] Svensson
[59] Bender
[60] Svensson
[61] Vidal

**IMAGE 1: THE ISLAMIC STATE'S TARGET AREAS IN IRAQ AND SYRIA**


**THE FALLUJAH DAM:**

During the American Invasion, Fallujah was a major battlefield. Continuous fighting eventually destroyed the city, leaving almost no infrastructure intact and scaring away nearly half the area's residents. However, the Islamic State held control of this dam on the Euphrates from January to April 2014, which allowed them to simultaneously flood the areas around Fallujah and cut off water to major portions of the country[62]. According to the U.S. Embassy in Baghdad, the Islamic State used Fallujah to cause a water shortage for hundreds of thousands of Shia Iraqis[63].

[62] Bender
[63] Svensson

**THE MOSUL DAM:**

The Islamic State has controlled the largest dam in Iraq, the Mosul Dam on the Tigris River, since June 2014[64]. Allegedly, the Iraqi military dropped their weapons and ran away when Islamic State insurgents arrived at Mosul[65]. Mosul's half-million residents were forced to flee the city because power and water were cut off. However, as soon as the water supplies were restored, most people returned to Mosul – many of them seeing it as liberation[66].

Even without sabotage, a compromised Mosul Dam could trigger immense destruction just as collateral damage[67]. Built in the late 1980s, Mosul has owned the title of "most dangerous dam in the world"[68]. According to a 2006 assessment by the U.S. Army Corps of Engineers, Mosul Dam was constructed on a highly unstable foundation of water-soluble rock in an area prone to sinkholes[69]. It has to be injected with grout around-the-clock to maintain structural integrity. In 2007, General David Petraeus – the former U.S. commander in Iraq – urged Prime Minister Nouri al-Maliki to prioritize bolstering the dam, but his counseling was unsuccessful[70]. It poses catastrophic risk even if the terrorists don't open the floodgates or blow it up. Analysts say that a compromised Mosul Dam could send as much as 50 million gallons of water per second crashing toward Mosul that would cover more than half the city under 25 meters of water[71]. It would also wipe out at least 250 square kilometers of prime farmland and flood Baghdad within days[72]
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[64] Bender
[65] Vidal
[66] Vidal
[67] Johnson
[68] Johnson
[69] Johnson
[70] Johnson
[71] Johnson
[72] Johnson

## Conclusion

Water resources are often overlooked when analyzing the origins of violent conflict around the world. Agriculture is the foundation for virtually every economy – it is necessary to understand how lack of water fatally disrupts that fiscal chain. In the case of Iraq, hydrologic facilities were primary targets for American troops; even a decade later, the country's infrastructure has barely begun to recover. After the war, Iraq was plagued with diarrheal diseases and was barely surviving off of food aid donations when a severe drought further intensified their hardship. For Syria, lack of water crippled many agriculture-dependent economies that had been stable for years, causing widespread migration. Both the Syrian and Iraqi regimes reacted callously or indifferently at a time when their people desperately sought relief.

It is this threat to survival – a lack of sustenance, impending disease, a loss of security – while seeing a neighbor that is full, healthy and safe, which creates violent conflict. More than ethnic or religious differences, it is the discrepancy between levels of economic security (and therefore personal safety) that causes one party to attack the other. Clearly understanding how water availability boosts or breaks local economies will be important as climate change intensifies, so that governments do not repeat the mistakes of al-Maliki and al-Assad.

Taking water resources for granted is a mistake that successful regimes of the future are not going to make. Already, insurgent groups such as the Islamic State have exploited the waters of the Tigris-Euphrates to their advantage. They have used the waters: militarily, by turning dams into massive weapons against the government; financially, by capitalizing on the hydroelectric resources of their targets; strategically, by drying up Shia lands; and socially, by gaining the admiration of locals when they are able to provide them with steady water and electricity. The rise of the Islamic State in Iraq and Syria is an important case study for understanding how water resources can be applied to either worsen or alleviate a violent conflict.

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*The New York Times is one of the most celebrated media companies in the world. It was won 114 Pulitzer Prizes since it's foundation 162 years ago, more than any other news organization. To date, it has published more than 58,000 issues. The research for this paper relied heavily on information from the New York Times, since it contained credible evidence that was not only extremely relevant, but also up-to-date.*

Aysan, Yasemin. "Emergency Appeal MDRSY002." Syria: Population Displaced from Iraq (n.d.): n. pag. Syria: Population Displaced from Iraq. International Federation of Red Cross and Red Crescent Societies, 17 Dec. 2009. Web. 28 July 2014

*The International Federation and Syrian Arab Red Crescent Society provided support to ensure that healthcare is accessible for all Iraqis and poor Syrians. The federation has responded to the needs of Iraqis displaced since April 2007. The society produced progress reports for distribution to donors, the Red Cross/Red Crescent societies, ministries, UN agencies, and NGOs.*

Bender, Jeremy. "ISIS Is Closing In On Iraq's Most Important Dam." *Business Insider*. Business Insider, Inc, 25 June 2014. Web. 04 July 2014. <http://www.businessinsider.com/isis-is-still-threatening-iraqs-water-supply-2014-6#ixzz36Pt15u15>.

*The website broadcasts news, gossip, conjecture, opinions and commentary. The Business Insider is an online source that does not screen or moderate all articles for accuracy; therefore, not all information from this site is credible. The topic was highly relevant to this paper however, so information used from it was first fact-checked against other sources before being included in the paper. It detailed ISIS' recent movements and strategy of dam control. The author, Jeremy Bender, holds a BA from Rutgers University in Middle Easter Studies and Religion. He also taught English at Inonu University in Turkey as a Fulbright Scholar.*

Brichieri-Colombi, Stephen. World Water Crisis : The Failures of Resource Management. London, GBR: I.B. Tauris, 2008. ProQuest ebrary. Web. 9 July 2014.

*This is book is an incredible achievement for the field of hydro-politics and exceedingly pertinent to this thesis. Though there are numerous books on the subject of water as a tool for conflict resolution, Brichieri-Colombi's is distinct in both its perceptiveness and 'on the ground' relevance. His work breaks down many of the lofty academic theories often distributed when talking about broad subjects such as 'war and peace' and discusses how hydro-politics can actually be used in the real world. Stephen Brichieri-Colombi is a consulting engineer and Senior Research Fellow at King's College, University of London. Brichieri-Colombi has 35 years' experience in water resource development, including widespread experience working in the Middle East.*

Carnegie Commission on Preventing Deadly Conflict, *Preventing Deadly Conflict: Final Report with Executive Summary*. Washington, DC: Carnegie Corporation of New York, 1997. Print.

*The Carnegie Corporation of New York commissioned this report in May 1994 to address impending threats of intergroup violence to world peace. The Carnegie Commission examined the principal causes of deadly ethnic, nationalist, and religious conflicts within and between states, as well as the circumstances that foster or deter their outbreak. The report aims to determine the functional requirements of implementing a system that can successfully prevent mass violence around the globe. The Commission is comprised of 16 international leaders and scholars with experiences in conflict prevention and resolution, with input from at*

*least 42 additional scholars. The Commission's approach is to use a public health model, with emphasis on primary prevention, and consideration to long-term, underlying factors.*

*This source provides numerous examples of the ways in which resources are an integral part of conflict prevention and dissolution. The source is two decades old; therefore, its analysis of the security situation in the Middle East is somewhat out of date. However, its broad ideas for the general concepts of violence cessation are highly relevant to the overall goal of this paper.*

Châtel, Francesca De. "The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution." *Middle Eastern Studies*. Routledge, 27 Jan. 2014. Web. 30 July 2014.

*This is a peer-reviewed journal article that was referenced by many sources. The author, Francesca, carried out extensive first-hand research in Syria during the drought of 2006-2010, in addition to interviews with Syrian officials, so the information is considered valuable for this paper. Francesca also spoke with water-related refugees in Damascus, and supplemented her theories with reports from various United Nations agencies.*

Chapin, Helen. "Iraq - Sunni-Shia Relations in Iraq." *Iraq - Sunni-Shia Relations in Iraq*. Washington: GPO for the Library of Congress, 1988. Web. 01 Aug. 2014.

*This manuscript was a research project commissioned by the U.S. Library of Congress under the Federal Research Division. There is little information given about the editor, Helen Chapin, likely because her research was concluded in 1988. Though the information is old, it is assumed the information is accurate because of federal context. The study was conducted to summarize the major social, political, economic, and military aspects of Iraqi society. The information was used in this paper to establish a background on Iraqi civilization.*

Chudacoff, Danya. "'Water War' Threatens Syria Lifeline." *Middle East*. Al Jazeera English, 7 July 2014. Web. 08 July 2014. <http://www.aljazeera.com/news/middleeast/2014/07/water-war-syria-euphrates-2014757640320663.html>.

Famiglietti, Jay. "The Middle East Lost a Dead Sea-Size Amount of Water in 7 Years." *National Geographic*. University of California, Irvine, 22 Feb. 2013. Web. 8 July 2014. <http%3A%2F%2Fnewswatch.nationalgeographic.com%2F2013%2F02%2F22%2Fweighty-water-matters-in-the-middle-east%2F>.

*The data from this source are derived from a NASA satellite mission and were interpreted by a highly reputable team, thus its findings are considered credible. The NASA satellite mission called GRACE (short for Gravity Recovery and Climate Experiment) was used to interpret water shortages in the Middle East. The study looked at water losses in Turkey, Syria, Iraq and Iran between 2003-2009. The figures from the study are used in this thesis to provide scientific background of the implications of climate change in the Middle East, so as to provide further grounding of the strategic importance of water resources there.*

*The National Geographic Society is a nonprofit scientific and educational institution that has been in operation since 1888. It focuses primarily on issues related to archaeology, natural science, historical conservation and the environment. The author, Jay Famiglietti, is a hydrologist and Senior Water Scientist at NASA's Jet Propulsion Laboratory. Jay is a professor at the University of California, Irvine, with research focusing on using satellites to track changing freshwater availability around the globe. His work has been featured in such sources the New York Times, the Los Angeles Times, The Economist, CNN, Al Jazeera, National Public Radio, BBC Radio, among others.*

Femia, Francesco, and Caitlin Werrell. "Syria: Climate Change, Drought and Social Unrest." *The Center for Climate Security*. The Sustainable Markets Foundation, 3 Sept. 2013. Web. 08 July 2014. <http://climateandsecurity.org/2012/02/29/syria-climate-change-drought-and-social-unrest/>.

*Francesco Femia and Cairlin E. Werrell are the Co-Founders and Directors of the Center for Climate and Security (CCS). CCS is a nonprofit climate change institute crafted by an Advisory Board of senior security leaders. The organization aims to facilitate climate change policy developments through careful research, analysis, and dialogue. The Center is funded by the Sustainable Markets Foundation, a 501(c)(3) organization.*

*Francesco has an extensive background in policy development, international climate programs, and writing Francesco earned his master's degree from the London School of Economics and Political Science. Caitlin Werrell's principal research interests include climate change, water policy and international security. She obtained her master's degree focusing on transboundary water issues from the University of Oxford. Over the past ten years, she has investigated the connection between security, natural resources, conflict and cooperation. Both authors have been cited by such sources as Defense News, the Reuters Foundation, the National Journal, the Bulletin of Atomic Scientists, Climate Progress and e-International Relations, and has been cited by the New York Times, the Washington Post, USA Today, CNN, NBC News, the National Review, Foreign Policy, the BBC, Slate, the Toronto Star, and the Atlantic, among others.*

*The authors of this article discuss the ways in which recent abuses to water resources contributed to the original unrest in Syria. It is significant to this paper because it supports the need for a holistic look at conflict management, by providing solutions that go beyond military control. Its content is not specific to ISIS, but it does support the underlying assumption of this thesis: water is more than simply a resource; it is intricately tied into all social, political, economic, and security aspects of life in this region.*

Friedman, Thomas L. "WikiLeaks, Drought and Syria." *The New York Times*. The New York Times, 21 Jan. 2014. Web. 15 July 2014. <http://www.nytimes.com/2014/01/22/opinion/friedman-wikileaks-drought-and-syria.html?_r=0>.

*Thomas L. Friedman won the 2002 Pulitzer Prize for commentary, his third Pulitzer for The New York Times. He became the paper's foreign-affairs Op-Ed columnist in 1995. Previously, he served as chief economic correspondent in the Washington bureau and before that he was the chief White House correspondent. In 2005, Mr. Friedman was elected as a member of the Pulitzer Prize Board. Mr. Friedman joined The Times in 1981 and was appointed Beirut bureau chief in 1982. In 1984 Mr. Friedman was transferred from Beirut to Jerusalem, where he served as Israel bureau chief until 1988. Mr. Friedman was awarded the 1983 Pulitzer Prize for international reporting (from Lebanon) and the 1988 Pulitzer Prize for international reporting (from Israel).*

*The New York Times is one of the most celebrated media companies in the world. It was won 114 Pulitzer Prizes since it's foundation 162 years ago, more than any other news organization. To date, it has published more than 58,000 issues. The research for this paper relied heavily on information from the New York Times, since it contained credible evidence that was not only extremely relevant, but also up-to-date.*

Gleick, Peter H. "Water, War & Peace in the Middle East." *Environment: Science and Policy for Sustainable Development* 36.3 (1994): 6-42. *ATMOS*. Global Environment Program of the Pacific Institute, 1994. Web. 30 July 2014.

*Peter is director of the Global Environment Program of the Pacific Institute for Studies in Development, Environment, and Security., based in California. Support for the institute's Middle East Water project has been given by the Ploughshares Fund.*

Holthaus, Eric. "Is Climate Change Destabilizing Iraq?" *Slate Magazine*. Graham Holdings, 27 June 2014. Web. 15 July 2014. <http://www.slate.com/articles/technology/future_tense/2014/06/isis_water_scarcity_is_climate_change_destabilizing_iraq.2.html>.

*Slate is a web-based magazine that has released daily publications since its founding in 1996. The article's author, Eric Holthaus, is a meteorologist who writes about weather and climate for Slate's Future Tense. Slate describes itself as a "general-interest publication" that offers analysis on topics covering news, business, technology, and culture. The magazine has a strong 'editorial voice' and so its commentary is more*

*pronounced than more reputable news sources. However, Slate has been the recipient of awards such as the National Magazine Award for General Excellence Online. The site is owned by the Graham Holdings Company and is supported by advertising revenues.*

Johnson, Keith. "Water Wars in the Land of Two Rivers." *Foreign Policy*. Graham Holdings, 2 July 2014. Web. 9 July 2014.

*In September 2008, FP was purchased by the Washington Post Company (now Graham Holdings), one of the world's most respected media organizations, and grew to become the FP Group – an expansion of Foreign Policy magazine to include ForeignPolicy.com and FP Events. The Post Company's leadership saw in FP an opportunity to build on past successes and use new media to serve decision-makers in business, finance and government in ways that would further establish Foreign Policy as the leader in its field.*

Motlagh, Jason. "Iraq's Waterless Christians: The Campaign to Expel a Religion." *Bloomberg Business Week*. Bloomberg, 22 July 2014. Web. 30 July 2014.

*Bloomberg News provides daily articles on economies, markets, companies, industries and governments. This article discussed the targeted use of the Islamic State's water resources against Christians in particular. While not used directly in constructing this thesis, it's supporting information about water facility use by the Islamic State was helpful information.*

NPR. "How Could A Drought Spark A Civil War?" *NPR*. National Public Radio, 18 Sept. 2013. Web. 01 Aug. 2014.

*NPR is a well-known, reputable source that has covered many Middle Eastern stories in the context of water scarcity. Information from this piece was used to discuss the ways in which Syrian conflict was affect by the drought of 2006-2010.*

Polk, William R. "Understanding Syria: From Pre-Civil War to Post-Assad." *The Atlantic*. Atlantic Media Company, 10 Dec. 2013. Web. 30 July 2014.

*William Polk's first report for the Atlantic was published in 1958 about tensions in Iraq during the Eisenhower administration. He has experience teaching at Harvard as well as working in the State Department's Policy Planning staff. Polk has been published extensively for international affairs expertise, particularly in the Middle East. Recently, he released a new book detailing current affairs of Kashmir, Pakistan, Afghanistan, Iran, Syria, Libya, and Mali.*

Svensson, Birgit. "Water as an Instrument of War." *Qantara*. German Foreign Office, 13 June 2014. Web. 09 July 2014.

*The Internet portal Quantara (Arabic for "bridge") represents the effort of the German center for Political Education to promote dialogue with the Arabic world. The Center attempts to promote understanding of political issues and strengthen democratic awareness.*

Vidal, John. "Water Supply Key to Outcome of Conflicts in Iraq and Syria, Experts Warn." *The Guardian*. Guardian News and Media, 03 July 2014. Web. 08 July 2014. <http://www.theguardian.com/environment/2014/jul/02/water-key-conflict-iraq-syria-isis>.

*The Guardian began solely as a UK newspaper and spread to an international digital news organization with over 40 million readers. Though perhaps not as credible than other news sources, the article's information about water supplies serving as military target is highly relevant to this paper. It provided specifics of ISIS' current targets, such as the Hathida and Nuaimiyah Dams, and why the rebels selected them. The author, John Vidal, has been the Guardian's editor for environmental stories since 1995. Mr. Vidal has authored McLibel: Burger Culture on Trial (1998) and contributed to chapters on books dealing with topics including: the Gulf war, new Europe and development.*

Worth, Robert F. "Earth Is Parched Where Syrian Farms Thrive." *The Middle East*. The New York Times, 13 Oct. 2013. Web. 28

*The New York Times is one of the most celebrated media companies in the world. It was won 114 Pulitzer Prizes since it's foundation 162 years ago, more than any other news organization. To date, it has published more than 58,000 issues. The research for this paper relied heavily on information from the New York Times, since it contained credible evidence that was not only extremely relevant, but also up-to-date.*