

Running head: WATER AS A WEAPON IN SYRIA AND IRAQ

University of Nevada, Reno

**Water as a Weapon in Syria and Iraq:
The self-proclaimed Islamic State and the War for Water and Power**

A thesis submitted in partial fulfillment
of the requirements for the degree of

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by

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Abstract

The self-proclaimed Islamic State is targeting water supplies throughout Syria and Iraq. This manipulation of water resources combined with seasonally hot and dry years, increasing populations and urbanization, and decrease in water quality, water security is soon to become a rare resource in the Tigris and Euphrates River Basin. For countries like Syria and Iraq, which rely almost exclusively on water from these rivers, the impact of the manipulation of these rivers by the self-proclaimed Islamic State is already leading to massive water shortages, starvation, disease, and displacement. The self-proclaimed Islamic State is diverting water, flooding communities, contaminating water sources, threatening destruction of dams, and controlling water only to sell it back to the governments and populations in the region. This thesis provides a chronology of water locations the self-proclaimed Islamic State has targeted and using the history and ideology of the organization provides predications of what the organization may do next.

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Introduction

In the wake of the attacks in the United States in 2001, it is hard to deny the influence the self-proclaimed Islamic State has over regions in the Middle East and beyond. The self-proclaimed Islamic State originates from a faction of Al-Qaeda known as Al-Qaeda in Iraq founded in 2004 when the group's founder, Abu Musab al-Zarqawi pledged his loyalty to Osama Bin Laden (Atwan, 2015). Under Abu Musab al-Zarqawi rule, Al Qaeda in Iraq led a successful insurgency in the namesake country until 2006 when the organizations leader was killed (Kennedy, 2001). United States forces coupled with Sahwa Councils made of Sunni Arab Tribesmen, weakened the organization's control in the region (Lister, 2015). Several subsets of the organization, including the Islamic State of Iraq and the al-Nusra Front in Syria began to see increased success by 2013 as changes in leadership and increase in funding and support took place. In early 2014, al-Qaeda's leader Ayman al-Zawahiri disavowed the Islamic State of Iraq and Syria, not claiming responsibility or support for the group's actions (Lister, 2015).

Ultimately, the self-proclaimed Islamic State's goal is to create one unified nation of the region of the Middle East with its people swearing allegiance to "true Islam" (Lister, 2015). The organization has been described as a well-trained militia known for its aggressive and organized military advances, taking over villages as the self-proclaimed Islamic State works to expand its territory gain (Kennedy, 2001). The self-proclaimed Islamic State targets any and all populations that do not follow their literalist religious beliefs; beliefs that includes other sects of Islam as well as other religions (Lister, 2015)

As the self-proclaimed Islamic State continues to gain territory throughout Iraq and Syria, the organization has also strategically targeted water (King, 2016). The organization has

attacked major dams such as the Baath Dam in Syria and the Mosul dam in Iraq; many of these dams provide water and power to nearby cities and villages (King, 2016). The self-proclaimed Islamic State is manipulating the water flow in order to harm populations in the area and provide its territories with water (King, 2016). While manipulation of water resources in the region is an ancient tactic, recent climate conditions and water shortages have heightened the severity of this threat.

This thesis will identify the water infrastructures currently claimed by the self-proclaimed Islamic State in Syria and Iraq. This research combined with an understanding of the history and ideology of the organization develops a thorough understanding of the self-proclaimed Islamic State in relation to water as well as an analysis of possible future expansion by the group. My research is supported by maps that depict possible future scenarios and their impacts.

While the topic of water conflicts has a deep literature base, the amount of research on this topic in relation to the self-proclaimed Islamic State is less extensive. The relative infancy of the organization and the currency of the events related to this thesis topic has led to only a few published articles and scarce consolidated data sources on the self-proclaimed Islamic state and water. While I only recorded events I found relevant to Iraq and Syria and within the scope of the thesis, this compilation of the attacks on water in Iraq and Syria alone adds knowledge and clarity to this area of research. Moreover, the research of this thesis will not only develop current research, but will argue through evidence that the way in which the self-proclaimed Islamic State is manipulating water should be of utmost concern for the regional and global security. Ultimately, the research presented here is timely and important in understanding possible counter-insurgency options and highlights the immediate threat of water scarcity that has been exploited by the actions of the self-proclaimed Islamic-State.

One final note I must address the decision to refer to the organization as the “self-proclaimed Islamic State” in this thesis. As is mentioned later, the organization has changed its name several times since its inception to reflect its goals and territory. While the name has evolved, governments, media, and academia have had to decide how they will refer to the group as. While most media and politicians from the United States have settled on “Islamic State” most other countries have opted for the term “Daesh” the Arabic acronym derived from a previous name for the organization, "al-Dawla al-Islamiya fil Iraq wa al-Sham" (Bennett, 2015). The acronym, denounced by the self-proclaimed Islamic State, is a rhetorical effort to resist legitimizing the organization as a “state” and distance the actions of the group from the religion of Islam (Bennett, 2015). While this thesis does not legitimize the status or legality of the actions of the group, according to William McCants, director of the project on U.S. Relations with the Islamic World at the Brookings Institution, western academia has opted to use “Islamic State” in order to remain more neutral (Bennett, 2015). Therefore, this thesis will henceforth use the term “self-proclaimed Islamic State” acknowledging although not endorsing, the rhetorical implications of this choice.

Methods

This research was conducted through two working methodologies. I first collected data from various sources creating a map of Iraq and Syria using Geographic Information Systems. This map contains data including locations of relevant rivers, lakes, streams, aquifers, barrages, and dams, as well as cities and territory claims of the self-proclaimed Islamic State, alternative non-state actors when applicable, and recognized governments. I chose to exclude additional infrastructure data that do not directly pertain to water infrastructure such as roads, transportation data, and government buildings and only include water ways pertaining to the thesis. The map

created an invaluable visual aid that combined all the elements of the thesis and allowed me to predict future advancements based on the location of water infrastructure relative to territory currently claimed by the group. I could not find a published map that included all the rivers, territories, cities, and dams I needed for my analysis, so I created my own map to benefit this research.

The map helps us to visually understand the migration of the self-proclaimed Islamic State as well as its current territorial claim in Iraq and Syria. Additionally, the map helps to assess the potential impact of various hypothetical scenarios by evaluating the population count and density as well as the distances between map features.

To complement the quantitative and qualitative analysis of the mapped data, I also performed a qualitative analysis of the literature base on the topic. This research helped create the background of the organization, its ideologies, as well as the success and failure of similar water strategies in the Middle East in the past. Additionally, because my research is based on current events, most of my data are primary sources, experiences recorded in magazines, newspapers, and blogs. Primary sources were the optimal choice in order to create the most complete and up to date data in relation to the organizations territory claims. I chose to combine these methodologies so that I could not only assess the way in which the self-proclaimed Islamic State is currently utilizing this strategy, but also to create predications on possible future threats to the water infrastructure in Syria and Iraq.

Literature Review

History of Water Conflict

The manipulation of natural resources against populations has existed since the beginning of civilizations. This phenomenon, defined in the literature as environmental terrorism, is the

“unlawful use of force against environmental resources or systems with the intent to harm individuals or deprive populations of environmental benefit(s) in the name of a political or social objective” (Katz, Gleick & Cooley, 2006). These sorts of attacks can include chemical or biological agents added to water supplies or attacks on water supply infrastructure (Katz et al., 2006). Unlike other forms of terrorism that have a limited impact beyond the execution of the attack itself, the impacts of environmental terrorism spread beyond the immediate violence and due to the “interconnectedness of the environment” the damage can spread far beyond (Schwartz, 1998). One reason why environmental terrorism poses a significant risk to countries is that “the risk of societal disruptions, disarray, and overreaction by governments is high” (Katz et al., 2006). Whether it is because the intricacies of ecosystems are not fully understood or because these attacks threaten necessary resources, established governments tend to overreact to these threats that only furthers the agenda of these terrorist organizations as defined above.

It is the potential for widespread damage and fear that has made the environment, and specifically water supplies a target of wars and terrorism for thousands of years (Katz et al., 2006). Water supplies, in this context are defined as “a complex interconnected set of water infrastructure designed to provide reliable safe water supplies and to remove and treat waste water” (Katz et al., 2006). According to the World's Water 2006-2007: The Biennial Report on Freshwater Resources, water supplies are one of the most desirable targets for terrorism because there is no substitute for water (Katz et al., 2006). With all the world’s technological and scientific advances, water still remains a finite resource, one that is necessary for survival.

The exploitation of this basic human need can be traced as far back as 2450BCE, when the King of Lagaah diverted water supplies in order to deprive regional enemies in Umma of water (Katz et al., 2006). Another example of water manipulation was in 1700BCE, when in a

battle for Babalyon, Hummurabi's grandson, Abi-Eshuh dammed the Tigris River in order to trap the retreating rebels (Katz et al., 2006). The strategy has continued to be utilized in modern conflicts such as in 1573 when the Dutch frequently flooded lands occupied by Spanish troops in Akmaar (Schwartz, 1998). This strategy was used throughout the war and became known as the "Dutch Water Line" (Schwartz, 1998). Manipulation of water supplies was also used in World War II by both the Axis powers and Allies; Germany flooded lands in order to stop the mobilization of the Allies while the Allies would bomb the dams. (Katz et al., 2006). While these attacks became a strategy of war intended to have an immediate impact in the conflict, events that diverted these resources had a more extended impact. Victims of these attacks experienced shortages of potable water and water for agriculture leading to a shortage of crops.

In the attacks that the self-proclaimed Islamic State has launched on water resources in Iraq and Syria, it appears that they are utilizing this "interconnectedness of the environment" in order to specifically target populations in the countries (Schwartz, 1998). Thus far its attacks have diverted water, flooded dams, and disabled hydropower plants that provide energy to communities (Cunningham, 2014). It seems as though the self-proclaimed Islamic State is manipulating environmental sources not only to gain the resource for their own use, but also to spread fear and instability beyond the initial attack (Schwartz, 1998).

Current climate conditions in Iraq and Syria have increased their vulnerability to ecological manipulation and threats. The Proceedings of the National Academy of Science in the United States published an article titled "Climate change in the Fertile Crescent and implications of the recent Syrian drought" that uses Syria to exemplify how lack of water resources weakens a country (Kelley, Mohtadi, Cane, Seager & Kushnir, 2015). Countries are weakened by manipulation of resources, whether created by natural or human occurrences. Syria's water

allocation was weakened by a corrupted government and further hurt by the 2007-2010 drought (Kelley et al., 2015). It is a combination of these factors that contributed to the outbreak of the Syrian conflict in 2011 (Kelley et al., 2015). A decrease in natural resources, especially water, leads to an increase propensity of violence as people become desperate for survival. With these conditions in mind, the self-proclaimed Islamic State is manipulating water resources in an already highly vulnerable area.

The Rise of the self-proclaimed Islamic State

History. Although the self-proclaimed Islamic State has only recently received public attention in the West, the organization itself dates back to at least 1999 to the founder Au Musab al-Zarqawi (Lister, 2015). After spending five years in al-Sawwaqa Prison in Jordan for the possession of weapons as well as his membership in a jihadist military organization known as Bayat al-Iman, Zarqawi fled to Afghanistan to form his own jihadi organization Jama'at al-Tawhid wa' al-Jihad (Lister, 2015). With the financial support of al-Qaeda, Zarqawi's organization was active in recruiting and training members and committing terrorist attacks targeting the country of Jordan and Shia populations (Johal, 2015). The organization quickly grew until late 1999, with the failed "Millennium Plot" the attempted bombing of several tourist locations in Jordan (Lister, 2015). Unlike other jihadist organizations that target Western populations or government locations, Zarqawi targeted civilizations and tourists mainly in Jordan and the regional area. Following the failed plot, Jama'at al-Tawhid wa' al-Jihad was forced to retreat until the group's reappeared in 2001 in the wake of September 11th attacks in order to support their then allies al-Qaeda and the Taliban against the invasion led by the United States (Lister, 2015)

The year 2003 marked the beginning of the Iraq War and the occupation of Iraq by the United States military forces (Johal, 2015). The region was still suffering from unrest and conflict as a result of the first Gulf War that began in 1991 (History, 2009). The first Gulf War was an international effort, led by the United States and other western nations to force Saddam Hussein to remove his Iraqi troops from neighboring Kuwait (History, 2009). The war only lasted a few weeks before Saddam Hussein accepted a peace treaty that allowed him to remain in power but forced him to recognize the sovereignty of Kuwait as well as destroy his country's weapons of mass destruction (History, 2009). In the years following the Gulf War, Hussein refocused his aggression against the Shi'ite and Kurdish populations within his territory (History, 2009). In response to a number of events including the attacks on the World Trade Center in New York in 2001 and Hussein refusing to let UN inspectors for weapons of mass destruction into Iraq, the United States began the second Gulf War, commonly referred to as the Iraq War, in 2003 (History, 2009). The presence of the United States in Iraq helped create the conditions that ultimately helped the future self-proclaimed Islamic State expand throughout the region.

In 2004, Zarqawi pledged his loyalty to Osama Bin Laden and Jama'at al-Tawhid wa' al-Jihad formally became a faction of al-Qaeda known as *anzim* *Qa'idat al-Jihad fi Bilad al-Rafidayn*, or more commonly known as al-Qaeda in Iraq (Atwan, 2015). Despite his pledged allegiance and the historical relationship between the organizations, Zarqawi's radical and extremist ideology conflicted with al-Qaeda. A fundamental difference between the two organizations was the way in which Zarqawi aggressively and violently targeted any and all Shia populations, believing in a cleanse of not only non-Muslims, but of "impure" Muslims as well (Lister, 2015). Al-Qaeda in Iraq was known for targeting locations where they could exploit the

tensions between the two factions of Islam (Lister, 2015). Using this as a weapon against the populations, al-Qaeda in Iraq was able to gain a lot of territory and power very quickly.

In 2006, al-Qaeda in Iraq merged with five other organizations to form Majlis Shura al-Mujahideen (Lister, 2015). Not long after this merge, Au Musab al-Zarqawi was killed in a United States airstrike (Kennedy, 2001). Zarqawi was thereafter thought of as a martyr for his cause and helped empower Majlis Shura al-Mujahideen to continue to grow and create al-Dawla al-Islamiya fi Iraq, or more commonly known as the Islamic State in Iraq (Lister, 2015). The Islamic State of Iraq was founded with the purpose of creating a self-sustaining “Islamic State” including an organized government and economy that would cover the entire territory of the Middle East (Lister, 2015).

Although the Islamic State of Iraq created a strong foundation, the organization was threatened by several outside forces including the United States, al-Qaeda, and the Sahwa councils, a local counter-insurgency effort made up of Sunni Arab Tribesmen (Lister, 2015). The Sahwa councils, supported by the United States and other local institutions, were successful in combating the Islamic State in Iraq’s territory gains (Lister, 2015). Throughout this time, counter-insurgency efforts were able to kill or capture all but eight of the Islamic State of Iraq’s top forty-two senior officers (Lister, 2015). However, in 2007 the Islamic State of Iraq was successful in killing the Sahwa councils’ leader, Sheikh Abd al-Sattar al-Rishawi (Lister, 2015). Despite this apparent success for the Islamic State of Iraq, the Sahwa councils, United States coalitions, and other jihadist and local organizations continued to weaken the organization in Iraq (Lister, 2015).

The Islamic State of Iraq was dormant for several months, until 2008 when the organization began restructuring and remobilizing its militia (Lister, 2015). The organization

exploited the weakening of the Sahwa council after the withdrawal of United States troops from Iraq (Lister, 2015). In addition to structural reform, the Islamic State of Iraq focused on expanding its financial stability. Through increased procession of oil wells, extortion, and taxes, the Islamic State of Iraq was able to become the wealthiest terrorist organization in the world (Lister, 2015). This further destabilized counter-insurgency efforts by the Sahwa councils; The Islamic State of Iraq was able to bribe and hire many Sahwa council members as well as local officials throughout Syria (Lister, 2015). This enabled the Islamic State of Iraq to acquire allies in political positions, giving them access to critical security information (Lister, 2015). By the early 2000's, the Islamic State of Iraq furthered its access to security information by targeting and threatening security and military officials and their families (Lister, 2015). This increased access to security intelligence allowed the Islamic State of Iraq to launch its "Breaking the Walls" campaign, attacks targeted at prisons in Iraq that led to the escape of hundreds of prisoners and militia members (Lister, 2015).

In 2011, the Islamic State of Iraq began to forge relations with existing jihadist organizations in Syria forming what was known as Jabhat al-Nusra (Lister, 2015). The organization was mostly comprised of individuals pardoned by Syrian President Bashar Assad. Jabhat al-Nusra became active in Syria, primarily targeting government entities (Lister, 2015). By 2013, the organizations in Iraq and Syria merged to form the Islamic State in Iraq and Syria. However, Jabhat al-Nusra resisted this merge, forcing the Islamic State of Iraq and Syria to create its own infrastructure in Syria (Lister, 2015).

In early 2014, the Islamic State of Iraq and Syria faced opposition from local and more moderate organizations and non-state actors in Syria. After continuing its aggressive and radical territorial campaign throughout Syria, al-Qaeda's leader Ayman al-Zawahiri disavowed the

Islamic State of Iraq and Syria, not claiming responsibility or support for the Islamic State of Iraq's actions (Lister, 2015). Despite this opposition, the Islamic State of Iraq and Syria continued to gain territory in Iraq and Syria and continue to do so today (Lister, 2015). As of 2015, the self-proclaimed Islamic State claims a territory the size of the state of Jordan (Johal, 2015).

Ideology and Religion. As its self-given name indicates, the organization is fighting in the name of Islam in order to form a Caliphate, an ancient religious term meaning the creation of an Islamic State (Crooke, 2014). The self-proclaimed Islamic State practices an adapted version of Wahhabism, a strict literalist Sunni interpretation of the Quran. This form of Islam was created in the 18th century by Ibn Abd al-Wahhab (Stanley, 2005). Wahhab was excommunicated from his home village in Arabia because of his radical interpretation of Islam, believing that his practices violated the tenants of Islam (Crooke, 2014). Wahhab migrated to central Saudi Arabia and was accepted by the Bedouin Tribe, nomads located within the Najd territory of the country (Stanley, 2005). The tribe's leader Muhammad Ibn Saud accepted Wahhab's beliefs and the ideals were spread throughout the region and emerged as Wahhabism.

Wahhabism focuses on the idea that western influence and a deviation from strict Islamic beliefs has led to a decline in the religion; thus, Wahhabists believe in an "Islamic Revival" through a purification of the religion (Stanley, 2005). Wahhabism is based on a strict interpretation of monotheism, or tawhid (Stanley, 2005). Wahhabists believe that Islam has declined in part due to a loose interpretation of the Quran that they believe to be polytheistic (Stanley, 2005). These polytheistic, or shirk practices include many traditions that are historically important to many sects of Islam; some of these practices include worship, prayers, or celebration of loved ones who have passed away including grave stones, belief or prayer to

saints or angels, pilgrimages, and religious celebrations including Prophet Mohammad's birthday (Crooke, 2014). Many sects of Islam including Shiaism and Sufism include these practices as a part of their beliefs (Crooke, 2014). The Takfir Doctrine of Wahhabism states that Muslims who violate the beliefs of Wahhabism are not Muslims; these "infidels" violate the fundamental beliefs of Islam which justifies their death and violation (Crooke, 2014).

While the original beliefs of Wahhab focused on education and enlightenment, following his death, Saud and other Wahhabists believed in purifying the Islamic world using violence and terror (Armstrong, 2014). In the name of Wahhabism, starting in 1790 Saud and his successor began to expand through the Arabian Peninsula, conquering towns and territories giving the prisoners a choice to convert to Wahhabism or die (Crooke, 2014). Massacres of populations were justified by the Takfir Doctrine, claiming that the "infidels" threatened the Islamic Revival (Armstrong, 2014). Wahhabists began to target Holy Cities such as Karbala in Iraq and Mecca (Crooke, 2015). Ultimately, in 1815, Egyptian and Ottoman forces were able to defeat the Wahhabi forces and destroy the first attempt at an Islamic State (Armstrong, 2014). Wahhabism was weakened although not defeated; after the collapse of the Ottoman Empire during World War I, Wahhabism was revived by Abd-al Aziz who created the Ikhwan, a new Islamic State territory (Armstrong, 2014). The Ikhwan expanded throughout Saudi Arabia with interests in expanding into Iraq and Jordan and Kuwait, however was defeated in 1930 (Crooke, 2014). The Ikhwan devolved into what is today the monarchy of Saudi Arabia, practicing a strict belief of Wahhabism similar to the non-violent tenets of its creator (Armstrong, 2015).

Today, Wahhabism is the national religion of Saudi Arabia and Qatar with a small minority presence in countries such as Iran, Iraq, Egypt, Pakistan and Afghanistan (Rakic & Jurisic, 2012). Moreover, while some countries recognize Wahhabism, many non-state actors

also follow its beliefs. Following the attacks in New York on September 11, 2001, the world became terrifyingly aware of the theologies of Wahhabism (Rakic & Jurisic, 2012, pp. 650-663). Wahhabism justifies the marginalization, extermination, and genocide of minority populations, the “infidels” who are seen as a threat to Islam (Stanley, 2005). Furthermore, Wahhabism is at the heart of the plight of extremists to jihad, meaning a fight in a Holy War against those who do not believe in Wahhabism (Rakic & Jurisic, 2012, pp. 650-663).

The self-proclaimed Islamic State practices a very extreme interpretation of Wahhabism even compared to other non-state actors such as the Taliban, Hamas, and al-Qaeda (Lister, 2015). The self-proclaimed Islamic State has denounced other jihadist organizations as “impure” and therefore non-Muslims, this has created a rift between itself and organizations such as Boko Haram in Africa and al-Qaeda in the Middle East (Crooke, 2014). Like the self-proclaimed Islamic State, al-Qaeda used violence in order to purify Islam; however, al-Qaeda used violence as means to an end, believing it was necessary for the Islamic Revival and their hopes of creating a Caliphate (Crooke, 2014). Comparatively, according to Crooke, the self-proclaimed Islamic State believes they have already created a Caliphate and therefore violence is not only a means to an end, but perhaps a new form of social order (Crooke, 2014). This nuanced distinction is one of the reasons the self-proclaimed Islamic State is a revolutionary threat; they are using violence and terror in a way that has not been seen in the current day.

The self-proclaimed Islamic State believes in a serious and literal interpretation of the Quran (Wood, 2015). Historically, the teachings of Prophet Mohammad and those inscribed in the Quran were written in a time of deep religious conflict, providing advice and laws applicable to a time of war (Wood, 2015). The self-proclaimed Islamic State is recreating these conditions through the literal interpretation and teachings of the religious texts (Wood, 2015). Most

Muslims understand the circumstances under which their religious texts were written, and as with any legal governing text from the Bible to the Constitution, it is meant to be interpreted for a modern world. Despite, its seemingly technologically advanced propaganda, recruitment, and war strategies, the self-proclaimed Islamic State is dedicated to a world of the ancient texts they worship (Wood, 2015).

As its name boldly suggests, the self-proclaimed Islamic State wants to create a nation of Islam controlled by the Caliph (Lister, 2015). On June 29, 2014, Baghdadi announced that he was the self-proclaimed Caliph (Wood, 2015). While the impact of this statement may have escaped western media, it has only emboldened the self-proclaimed Islamic State and its followers. The announcement established Baghdadi as the first apparent Caliph in the world in over 1,000 years (Dueholm, 2015). A Caliph is thought to be a decedent of the Prophet Mohammad who will be the ruler of all of the Muslim world (Wood, 2015). Once established, all Muslims are expected to move to live under and pledge allegiance to the caliph (Wood, 2015) It is predicted that there will be twelve caliphs, with Baghdadi being the eighth (Wood, 2015) The Caliph is not to be restrained or bound by manmade laws or political structures (Dueholm, 2015). Many countries and Muslims reject Baghdadi as the Caliph while Saudi Arabia is divided on the issue (Wood, 2015). While the royal family and government refuse to recognize Baghdadi as a Caliph, partially because they do not want to give up their power, some Saudis believe and support the Caliphate that the self-proclaimed Islamic State has created (Armstrong, 2014). According to ancient Islamic texts, there are requirements for an individual to become Caliph; he must control territory, be a direct decedent of Prophet Mohammad from the Quraysh Tribe, and strictly follow Sharia Law within his territory (Dueholm, 2015). Strict accordance with Sharia law includes ancient practices such as stoning, slavery, and social welfare services (Wood, 2015). While al-

Qaeda worked towards creating a Caliphate in the distant future, the self-proclaimed Islamic State has created one that is seemingly flourishing (Lister, 2015). One explanation for this may be that while al-Qaeda worked within the established political systems, taking over established countries and working within the governmental entities, the self-proclaimed Islamic State works outside of these established institutions. The self-proclaimed Islamic State does not believe in established borders between countries (Lister, 2015). It is against Islamic Law to create and uphold permanent borders, meaning that the self-proclaimed Islamic State will always have to fight to break down country borders as they have been doing in Iraq and Syria (Wood, 2015). This ideology is uniquely threatening because the self-proclaimed Islamic State does not appear to desire recognition from the existing political structures making international counter-insurgency efforts significantly less effective. It is, in fact, against the interpretation of Islamic Law to participate in the established political systems; even if that political system is in support of the Caliphate (Wood, 2015).

While some jihadist organizations have also followed the faith of Wahhabism, the self-proclaimed Islamic State has implemented a unique interpretation of it. Unlike al-Qaeda who operated through fragmented pockets of followers, the self-proclaimed Islamic State creates substantial and stable communities governed strictly under Sharia law (Wood, 2015). These communities provide their people with complete social welfare services that include complete health care coverage, education, housing and so on (Wood, 2015). Moreover, another difference between the self-proclaimed Islamic State and other jihadist organizations, is their strict belief in the oncoming apocalypse (Wood, 2015). The self-proclaimed Islamic State believes that the Mahdi will soon appear to them; the Mahdi is a religious figure the organization believes will appear to guide the self-proclaimed Islamic State before the apocalypse (Wood, 2015). The

apocalypse itself is predicted in some Sunni religious texts to be a battle between the powerful Caliphate and a foreign military; references to this final battle are found throughout the organization's propaganda materials (Wood, 2015). The self-proclaimed Islamic State believes that this final battle will happen in Dabiq, Iraq against a foreign military (Wood, 2015).

The Caliphate marks the end of a well-organized five-step development plan (Lister, 2015). Step one was hijra, or migration of followers to regions around the Middle East in order to gain territory to establish a Caliphate (Lister, 2015). Second step was jama'a, or congregation of followers to establish cities under the authority of the self-proclaimed Islamic State (Lister, 2015). Third was taghut, or destabilization of surrounding territories in order to weaken resistance and gain support of local peoples (Lister, 2015). Next was tamkin, or consolidation of their territories and followers (Lister, 2015). Finally, was the khilafa, or the creation of a Caliphate (Lister, 2015). Now that the self-proclaimed Islamic State has reached their goal, they now hope to expand and sustain (Lister, 2015). One vulnerability the self-proclaimed Islamic State has is that as a Caliphate, there is a prescribed and predictable way in which they must act (Wood, 2015). This means that the actions of the organization are, to a degree, predictable to those who have studied the Sunni texts (Wood, 2015).

Infrastructure: Organization, Money, and Recruitment. Many of the senior officials within the self-proclaimed Islamic State are well educated and trained. The most currently reported caliph, or leader, of the organization is Ibrahim' also known as Abu Bakr al- Baghdadi (Lister, 2015). He is an Iraqi native from the Bobadri tribe, the tribe thought to be the decedents of the Prophet Mohammad (Wood, 2015). Sunni Muslims believe that the next Caliph, or rather successor to the Prophet, must be a direct decedent of Prophet Mohammad, giving Baghdadi a birthright to his position as Caliph of the self-proclaimed Islamic State (Wood, 2015). Moreover,

Baghdadi is well educated holding a bachelor's degree, master's degree, and Ph.D. in Islamic Studies from the Islamic University of Bagdad. Beyond his education, Baghdadi is known for his ruthless leadership experience gained through the founding of the anti-western jihadist group *amaat Jaish Ahl al-Sunnah wal Jamaa* and his involvement with the self-proclaimed Islamic State since 2006 (Lister, 2015).

The organization of the self-proclaimed Islamic State is sophisticated and evolutionary, organized with titles, jurisdictions, and a strict hierarchy. Caliph Baghdadi has two Deputies that serve below him, *bu Muslim al-Turkmani* and *Abu Ali al-Anbari* (Wallace, 2016). His deputies, like many senior members of the self-proclaimed Islamic State, were trained by the militaries of various countries and non-state actors including Iraq, Georgia, Tunisia, along with others (Lister, 2015). These deputies divide jurisdiction between Iraq and Syria and are responsible for the social, militant, and operational duties within each country (Lister, 2015). The deputies sit on a council known as "Bagdadi's Cabinet"; the cabinet is composed of the leaders of every department and council within the self-proclaimed Islamic State (Wallace, 2016). Other members of his "cabinet" include the Senior Military Commander who is responsible for the overall military strategy of the self-proclaimed Islamic State, coordinating attacks and strategies within Iraq and Syria (Wallace, 2016). Below the Senior Military Commander is the Chief of Syria Military Operations and Chief of Iraq Military Operations who control the military strategies specifically within those countries (Lister, 2015).

The self-proclaimed Islamic State has several councils in addition to the Military Council, including the Sharia Council that is responsible for maintaining order in accordance to the organizations strict sect of Islamic Law (Wallace, 2016). Within the Sharia Council is the sharia police force, former local authorities who transitioned to sharia police officers once the

self-proclaimed Islamic State took over (Wallace, 2016). Moreover, the self-proclaimed Islamic State has also created Sharia courts within towns they took over, creating a mechanism for civilians and authorities to bring religious and civil charges against those it believes have violated Sharia Law or the Koran (Wallace, 2016). Punishments for those found guilty include fines, prison sentencing, “shaming”, as well as cruel punishments such as amputations and execution (Wallace, 2016).

Moreover, the self-proclaimed Islamic State has also created ministers for various responsibilities including a War Minister, Minister of General Management, Minister of Prisoners, Minister of General Security, Minister of Finance, Minister of General Coordination, Minister of Foreign Fighters and Suicide Bombers, Minister of Social Services, and Minister of Weapons (Wallace, 2016). The organization of the self-proclaimed Islamic State mocks modern day government structures; this system is particularly successful because many territories the self-proclaimed Islamic State conquers lack structure and basic necessities, making the citizens thankful for the social services and stability of the organization (Lister, 2015). For example, the self-proclaimed Islamic State has an Education Council to implement an approved curriculum for children under its control (Wallace, 2016). Through this council, the self-proclaimed Islamic State is providing children access to education that they did not have before and providing paid jobs for teachers in the community (Lister, 2015). This is one reason why the self-proclaimed Islamic State is so dangerous, because they are not only a strategic and ruthless military, but also because they are implementing a seemingly sustainable life style for civilians.

Unlike other jihadist organizations, the self-proclaimed Islamic State has already created the infrastructure for the Islamic State they hope to create. The formation and organization of this infrastructure resembles a bureaucracy (Johnston, 1993). In the 1930s Max Weber, a German

sociologist, identified several primary characteristics of a model bureaucratic structure (Johnston, 1993). These characteristics includes having a hierarchical structure, a system of management by which decisions from the top are executed by the lower levels, being organized by specialty, an “in-focused” mission where the organization focuses on their end goals, and an organization where all employees and customers are treated equally (Johnston, 1993). The self-proclaimed Islamic State arguably meets all but the last of these characteristics; while it has an organized hierarchy divided by ability, they treat people differently based on their religious affiliation and their allegiance or resistance to the organization. Many progressive countries utilize the bureaucratic system, making the self-proclaimed Islamic State’s use of the system possibly viable and uniquely appealing to many populations in the region who lack a stable government.

One of the Councils within the self-proclaimed Islamic State is the Council of Finance that manages, documents, and organizes the organization’s revenue and expenditures (Wallace, 2016). The self-proclaimed Islamic State is the world’s wealthiest terrorist organization (Johal, 2015). Similar to other jihadist organizations in the region, anonymous donors who believe in the superiority of Sunni Islam and the quest to create a caliphate initially funded the self-proclaimed Islamic State (Gordts, 2014). These donors are predominantly from Arab nations including Kuwait, Qatar, and Saudi Arabia (Gordts, 2014). In addition to individuals, governments have also been linked to funding the self-proclaimed Islamic State, usually through proxy organizations that pledge allegiance to the self-proclaimed Islamic State or that were incorporated by them (Gordts, 2014).

As the self-proclaimed Islamic State expanded and gained more territory, the organization became more self-sufficient and less reliant on private donors. Today the self-

proclaimed Islamic State has many revenue sources including currency transfers through “crypto-currency” including bitcoin and prepaid credit cards (Satti, 2014). Additionally, taxes, fees, robberies, the sale of women and slaves, the sale of artifacts stolen from ancient cities, and black market oil sales also support the organization (Gordts, 2014). It is this “diversified economy” that has enabled the self-proclaimed Islamic State to grow and become the self-sufficient organization that it is today (Francis, 2015). It is estimated that the self-proclaimed Islamic State has \$2 trillion in assets and makes \$2.9 billion in revenue a year (Francis, 2015).

Taxes, or extortion, of the people under the control of the self-proclaimed Islamic State is one of the most lucrative revenue sources for the organization accounting for \$600 million annually (Francis, 2015). Some taxes implemented by the self-proclaimed Islamic State include a 5 percent tax on sales to support social welfare programs and the salaries of its militants with an additional 2.5 percent tax on the local shops themselves (Francis, 2015). Other services provided in areas controlled by the self-proclaimed Islamic State include garbage collection, medical services, and education are taxed as well (Francis, 2015). Additional fees include \$800 on vehicles that enter Iraq through territories controlled by the self-proclaimed Islamic State as well as a \$200 tax on drivers to use the road in northern Iraq (Francis, 2015).

Another source of income for the self-proclaimed Islamic State includes bank robberies that account for \$500million-1billion in revenue a year (Francis, 2015). The self-proclaimed Islamic State militants target banks and treasuries in the territories that they invade using force and violence to acquire the money (Francis, 2015).

One of the most concerning and lucrative financial strategies of the self-proclaimed Islamic State is to raid and sell antiques found at archeological sites including Palmyra, Raqqa, Dura-Europos, and Apamea (Scammell, 2015). The organization does not only sell the artifacts

from these sites, but they also charge locals to dig there (Scammell, 2015). The self-proclaimed Islamic State created a department within their governance known as the Diwan al-Rikaz, responsible for regulating and selling permits for locals to dig at these ancient sites (Francis, 2015). The self-proclaimed Islamic State will charge people for digging permits as well as an additional 20-50% tax on the items they discover (Francis, 2015). The organization makes around \$100 million a year from the sale of these ancient artifacts (Francis, 2015). This issue of the destruction and looting of ancient sites has drawn particular concern from the international community. Late 2015, the United Nations Educational, Scientific and Cultural Organization responded to this threat from the self-proclaimed Islamic State by sending United Nations peacekeepers to these sites to protect them from harm (Scammell, 2015). Irina Bokova, chief of the United Nations Educational, Scientific and Cultural Organization stated that “Cultural cleansing is human tragedy of Middle East”; not only is this practice of looting ancient ruins fueling a group who promotes violence against native populations, they are also destroying the sanctity and history of an entire race of people (Scammell, 2015).

Not only does the self-proclaimed Islamic State violate sacred land in order to fund their organization, they exploit humans as well. Kidnappings and the subsequent ransom demands have been another source of income for the self-proclaimed Islamic State. The organization kidnaps individuals, demanding a ransom from their family or government. Although some countries including the United States refuse to pay these ransoms, many countries give into the demands (Francis, 2015). Some reports estimate that some European countries have given into the ransom demands, paying millions of dollars for the safe return of their citizens (Windrem, 2014). Moreover, the self-proclaimed Islamic State also profits from selling women and children as sex and labor slaves (Francis, 2015). The self-proclaimed Islamic State uses the Koran in

order to justify the rape and sexual assault of women who are non-Muslim or of minority Muslim sects including Shiites, Sufis, Yazidis, and Ba'hai (Lister, 2015). As with all aspects within the organization, the sale of women and children is organized and well documented. Sales are notarized by the Islamic Courts and the Islamic State Research and Fatwa Department within the self-proclaimed Islamic State even released a manual with the rules and regulation regarding sex slavery and rape (Callimachi, 2015). The manual includes details of when it is permissible to rape women and the legality of the sale and procession (Lister, 2015).

In addition to extorting and violating the people of the region, the self-proclaimed Islamic State earns \$1 million-\$1.5 million from black market oil sales a day (Nakhle, 2015). It is reported that the self-proclaimed Islamic State has control of nine to eleven oil fields throughout Iraq and Syria including al-Omar, Ajil, Allas, and al-Jibssa oil fields (Nakhle, 2015). Some of the most lucrative oil fields are found in Syria and can produce 30,000-40,000 barrels a day (Nakhle, 2015). The self-proclaimed Islamic State sells the oil to locals or governments for \$20-40 per barrel; locals will then bring the oil back to their country through old trade routes and sell the oil and make about \$80-90 per barrel (Nakhle, 2015). The locals and governments they sell to may or may not support the self-proclaimed Islamic State; usually they just need the finite resource that the self-proclaimed Islamic State has a monopoly over. Countries that buy oil from the self-proclaimed Islamic State include Saudi Arabia and as well as Iraq and Syria (Nakhle, 2015). The self-proclaimed Islamic State's access to these oil fields has increased their sustainability and viability as they are now able to provide the people under their control a source of energy and an additional job market (Nakhle, 2015). While recent United States air strikes of oil fields have threatened this production, the self-proclaimed Islamic State has continued daily production and sale of oil throughout the black market in the region. Oil prospects have guided the self-

proclaimed Islamic State's expansion; they hope to expand territorially to Libya in order to take control of their oil supply and take advantage of their geographic position between the Middle East, Africa, and Europe (Francis, 2015).

The self-proclaimed Islamic State relies on its network of revenue in order to buy weapons, offer competitive salaries to militia and civilians, as well as recruit. The self-proclaimed Islamic State is as successful as it is because of its recruitment strategies. There are many strategies the organization utilizes in order to reach potential recruits of all nationalities, religions, ethnicities, and genders. The self-proclaimed Islamic State primary recruitment tool is the internet; the technology enables them to target demographics, such as women and European countries, that they would otherwise not be able to target (Wood, 2015). It is estimated that the self-proclaimed Islamic State has about 100,000 fighters who have pledged allegiance to them; of this 100,000, approximately 30,000 fighters are foreign recruits, meaning men and women from countries other than Iraq and Syria (Atwan, 2015). Of these foreign fighters 21 percent are from Libya, 16 percent are from Tunisia, 16 percent are from Saudi Arabia, 11 percent are from Jordan, 10 percent are from Egypt, and 8 percent are from Lebanon. (Atwan, 2015). While many fighters are from regional Islamic countries, the self-proclaimed Islamic State's influence has also been able to extend to western countries with a notable 6 percent of foreign fighters originating from France and 4.4 percent from Britain (Atwan, 2015). Overall, the self-proclaimed Islamic State is estimated to have fighters from almost 80 countries including 100 from the United States and 2,000 from Europe (Atwan, 2015). Many governments have tried to prevent their citizens from leaving the country to join them; Russian, Saudi Arabia, and Australia have made joining the self-proclaimed Islamic State a crime (Atwan, 2015). The propaganda produced by the organization is multifaceted and pervasive. The self-proclaimed Islamic State utilizes

Twitter, YouTube, their own Newspaper, and websites to educate foreigners from around the globe about their organization (Atwan, 2015).

Water Conditions in Iraq and Syria

The Euphrates and Tigris River Basin. The main water sources for the region, including Iraq and Syria, are the Euphrates and Tigris rivers (S.J., 2014). These two water sources sustain life for an approximate 10 million people. The Euphrates for example provides Iraq with 98% of their surface water (S.J., 2014).

The Euphrates River flows for 2,786 km from the Armenian Mountain range in Turkey, running south through Syria and Iraq until it merges with the Tigris River at the Shatt al Arab Basin and flows through into the Persian Gulf (Majdalani, Cherfane & Renck, 2013). The Euphrates River basin is shared amongst five countries in the region; 28 percent of the basin is located in Turkey, 22 percent in Syria, 47 percent in Iraq, with a sparse yet notable 2.97 percent in Saudi Arabia and 0.03 percent in Jordan (Majdalani et al., 2013). Within the countries this thesis focuses on, the Euphrates River supports 5.69 million people in Syria and 7.15 million more people throughout Iraq (Majdalani et al., 2013). The Euphrates River has two headwaters located in Turkey, the Karasu and Murat Rivers (Majdalani et al., 2013). While 89 percent of the Euphrates River is replenished in Turkey by these headwaters and smaller tributaries, Syria has three main tributaries that provide 11 percent of the rivers total flow (Majdalani et al., 2013), while there are no tributaries for the Euphrates River within Iraq (Majdalani et al., 2013).

The first Syrian tributary is the Sajur River is formed in Turkey and flows for a total of 108 km with a mean annual flow volume of 98 MCM (Majdalani et al., 2013). 60 percent of the tributary flows in Turkey and 40 percent within Syria where it meets the Euphrates River just below the city of Jarablus (Majdalani et al., 2013). Dramatic climatic conditions combined with

the Kayacik Dam in Turkey have diminished the flow of the Sajur River through Syria and the Euphrates River; at some times of the year the Sajur River does not even flow to the Euphrates (Majdalani et al., 2013). In 2005, the Sajur Dam was built in Syria for storage purposes and has a reservoir capacity of 14.5 MCM (Shamout, 2015).

The second tributary is the Jallab and Balikh River which flows for a total of 196 km (Majdalani et al., 2013). The Jallab River originates in Turkey where it merges with the Balikh River in Syria and joins the Euphrates River below Lake Assad; 62 percent of the river basin is located in Turkey and 38 percent located within Syria (Majdalani et al., 2013). This river is replenished by the Ain al Arous and Ras al Ain Springs from the Midyat Aquifer in Syria, streams throughout that empty into the tributary, as well as manmade reservoirs in Turkey (Majdalani et al., 2013). Like the Sajur River, the Ain al Arous Spring and therefore the tributary does not meet the Euphrates River year around (Majdalani et al., 2013). Currently, the Jallab River does not have any dams or regulators built in its basin and the water that flows is primarily used for agriculture through federal projects such as the Balikh Irrigation Project (Majdalani et al., 2013).

The largest tributary to the Euphrates River is the Khabour River which flows 388 km through three countries with a mean annual flow volume of 924 MCM (Majdalani et al., 2013). 6 percent of the Khabour River basin is located in Iraq, 28 percent in Turkey, and 66 percent is located in Syria where the tributary meets the Euphrates River near Deri ez Zor (Majdalani et al., 2013). The Khabour tributary is replenished by precipitation, groundwater from Ras al Ain and Ain al Arous Springs that flow from the Midyat Aquifer, and from the Khabour Triangle, an intersection of several streams and wadis (Majdalani et al., 2013). The Khabour basin contains three dams that regulate water flow: the Hasakah East, Hasakah West, and the Bassel al Assad

Dams (Shamout, 2015). The Haskakah East and Hasakah West were built in 1990 on tributaries of the Khabour River and the Bassel al Assad Dam, also known as the Khabour Dam was built on the Khabour River itself; these dams were developed specifically to develop the agricultural industry in the basin (Majdalani et al., 2013).

While only 17 percent of the Euphrates River basin is located in Syria and 49 percent in Iraq, the two countries are dependent on the river for water (United Nations, 2003). Because of this dependence, both countries have developed dams, aquifers, lakes, water pumps, and additional water infrastructure around the river. The Euphrates River flows south from Turkey into Syria at Jarablus in the Aleppo Governorate through the city of Aleppo, currently under the control of the self-proclaimed Islamic State (Lossow, 2016). The river continues southeast 97 kilometers until it meets the Tishrin Dam, which was controlled by the self-proclaimed Islamic State from November 2012 until December 2015 (Lossow, 2016). The Euphrates River then meets the Baath Dam and Tabqa Dam, both claimed territories of the self-proclaimed Islamic State since February 2013 (Lossow, 2016). The river then flows into Iraq to the Haditha Dam that has been besieged by the self-proclaimed Islamic State for over 18 months (Lossow, 2016). The river then passes through the Tharthar Dam, Tharthar Canal, and Lake Tharthar, territories that were controlled by the self-proclaimed Islamic State between April 2014 and September 2015 (Lossow, 2016). Flowing further south the Euphrates meets the Fallujah Dam, also known as the Nuaimiyah Dam in the Anbar Province of Iraq controlled by the self-proclaimed Islamic State since January 2014 (Lossow, 2016). Just north of the city of Ramadi, the capital of the Anbar province, the river flows through the Ramadi Dam; the Ramadi Dam and its reservoir, Lake Habbaniya have been under the self-proclaimed Islamic State's control since May 2015

(Lossow, 2016). The Euphrates then flows near Baghdad, the capital of Iraq, before emptying into the Shatt al Arab Basin (Lossow, 2016).

The Tigris River flows for 1,800 kilometers from the Taurus Mountain range in Turkey, along the Turkish-Syrian border, runs south east through Iraq before it meets with the Euphrates River at the Shatt al Arab Basin and flow through into Iran (Majdalani et al., 2013). The Tigris River basin is shared amongst four countries in the region, Turkey with 24.5 percent of the basin, Syria with 0.4 percent, Iraq 56.1 percent, and Iran with 19 percent of the basin within its borders (Majdalani et al., 2013). The river's two main headwaters, the Batman River and the Botan tributary are both located in Turkey (Majdalani et al., 2013). In addition to the headwaters, many tributaries throughout Turkey, Iraq, and Iran join the Tigris and contribute a significant amount of water to its flow (Majdalani et al., 2013). The head of most of these tributaries are supported by ground water from the Bai-Hassan-Muldadia Aquifers located in the Taurus-Zagros Mountain range in northern Turkey and Iran (Majdalani et al., 2013). In Iraq there are four tributaries that are important to note.

The first tributary is the Feesh Khabour River, also known as the Little Khabour, originates in Turkey, flowing south into Iraq for a total of 181 km; 57 percent of the river is located in Turkey and 43 percent is located in Iraq (Majdalani et al., 2013). The Feesh Khabour has a mean annual flow volume of two BCM and does not have any reported dams on the main river nor any of its tributaries (Majdalani et al., 2013). While there is little evidence of support from groundwater as it flows through Turkey, the Feesh Khabour is replenished by groundwater supplies in northern Iraq before it meets to Tigris River (Majdalani et al., 2013).

The largest tributary to the Tigris River is the Greater Zab River flowing for 462km with a mean annual flow volume of 12.7BCM; the river originates in Turkey and flows south into Iraq

where it joins the Tigris River only 49 km south of the city of Mosul (Majdalani et al., 2013). Only 35 percent of the tributary is located in Turkey with a majority 65 percent located in Iraq (Majdalani et al., 2013). Neither Turkey nor Iraq has built dams along the Greater Zab River yet, although both plan to; Iraq plans on constructing the Bekhme and Mandawa Dams in the Greater Zab River basin in hopes of producing an addition hydropower generation capacity of 1,500 megawatt each (Majdalani et al., 2013).

The third tributary is the Lesser Zab River, originating in Iran and flowing into Iraq south of the Greater Zab River (Majdalani et al., 2013). This tributary flows for a total length of 302 km and has a mean annual flow volume of 7.8 BCM, meeting the Tigris River 220 km north of the capital city of Baghdad in the city of Fatha (Majdalani et al., 2013). Only 24 percent of the Lesser Zab River is located in Iran with the remaining 76 percent located in Iraq (Majdalani et al., 2013). Three dams regulate the flow of the Lesser Zab River in Iraq. The Dukan Dam was built in 1961 near its namesake city and stands 116 meters high and has 6,800 million m³ reservoir capacity (Food and Agriculture, 2008). The Dukan Dam is used for flood control, irrigation, storage, hydropower with a maximum storage capacity of 6,970 million cubic metres (Majdalani et al., 2013). The Dibis Dam was completed in 1965 and is located south of the Dukan Dam, before the convergence of the Lesser Zab River and the Tigris River. The Dibis Dam stands 15 meters high with 3,000 million m³ reservoir capacity and is used for the Kirkuk Irrigation Project (Majdalani et al., 2013). The final dam on the Lesser Zab River is the Taq Taq Dam which was just completed in 2015 (Majdalani et al., 2013).

The final major tributary for the Tigris River is the Diyala River, originating in Iran and tracing the Iranian-Iraqi border before merging with the Tigris just south of Baghdad in Iraq; 25 percent of the river basin is located in Iran and the remainder flows within Iraq (Majdalani et al.,

2013). The Diyala River flows for a total of 574 km and has a mean annual flow volume of 4.6 BCM (Majdalani et al., 2013). This tributary has three dams built in the Iraqi river basin, the Derbendi Khan Dam, Hemrin Dam, and the Diyala Weir (Majdalani et al., 2013). The Derbendi Khan Dam was completed in 1962 near the city of Ba'qubah and stands 15 meters tall and a reservoir capacity of 3,000 million m³ (Food and Agriculture, 2008). The Hemrin Dam was completed in 1980 just south of Derbendi Khan Dam; the dam stands 40 meters tall and a reservoir capacity of 4,000 million m³ (Food and Agriculture, 2008). The Diyala Weir, or barrage, was completed in 1969 and is located south of the Hemrin Dam just before the Diyala River merges with the Tigris; the weir was built to regulate overflow from the upstream dams and for irrigation (Majdalani et al., 2013). The Diyala River is recharged by surface level aquifers located at the border of Iran and Iraq of the river basin (Majdalani et al., 2013).

The Tigris River supports 50,000 people within Syria and 18 million within Iraq (Majdalani et al., 2013). Along the border, people within Syria are able to use the Tigris River for small scale agricultural use (Majdalani et al., 2013). The river basin supports an estimated 18 million Iraqis and 50,000 Syrians (Majdalani et al., 2013) with irrigation, electricity, and drinking water.

The land around the Tigris River proper is also developed to provide the countries a supply of water, irrigation, and electricity. The Tigris River enters Iraq and meets the Mosul Dam, located just north of its namesake city (Majdalani et al., 2013). While the city of Mosul is under the self-proclaimed Islamic State's control, the Mosul Dam is under Kurdish control (King, 2016). The Tigris River continues to flow south through the country through the Samarra Dam located south of Samarra, before flowing through the capital city of Baghdad (Majdalani et al., 2013). Below the capital city, the river flows through Iraqi marshes including the the

Chibayish Marshes located near the Nasiriyah Province in the Shatt al Arab Basin before reaching the Persian Gulf (Majdalani et al., 2013).

Ultimately, the Euphrates and Tigris Rivers converge in the Shatt al Arab Basin in Iraq near the city of Qurnah (Majdalani et al., 2013). The Shatt al Arab River is joined by two main tributaries, the Karkheh and Karun Rivers breaks into several branches of marshland at the Shatt al Arab Delta which then empties into the Persian Gulf (Majdalani et al., 2013). Climatic conditions, past and current conflict, and manmade water features such as the Karkheh Sam in Iran have destroyed the flow of the Shatt al Arab River which seldom reaches the gulf (Majdalani et al., 2013).

Hydro-Diplomacy in the Region. In addition to conflict created by non-state actors in the region, the Turkish, Syrian and Iraqi governments play a large role in the allocation, or arguably, misallocation of water. While there are currently no international agreements that outline water allocation among all three riparian states, Turkey Syria, and Iraq, there are currently thirteen international agreements relating to the Euphrates River in the region, eight relating to the Tigris River, with four of those agreements pertaining to both (Majdalani et al., 2013). The first agreement was the Franco-British Convention signed in 1920 by Syria and Iraq while they were under still the control on France and Great Britain, respectively (Majdalani et al., 2013). The agreements established a committee that would be responsible for allocation of water from the Euphrates and Tigris Rivers (Majdalani et al., 2013). Talks between Iraq and Syria continued for decades with little success until 1990 when the two countries signed the Water-Sharing Agreement that established a set allocation ratio of the Euphrates River (Majdalani et al., 2013). In 2002, the two countries signed the Agreement on the Creation of a Pumping Station in Syria on the Tigris where Iraq gave approval for a water pump to be built on

the Tigris River (Majdalani et al., 2013). In 2009, Iraq and Syria signed the Protocol on Water, part of The Memorandum of Understanding on Water, an agreement to share information and technology relating to water (Majdalani et al., 2013). While the two countries are in constant negotiations, the ongoing Syrian conflict along with non-state actors maintaining control over water infrastructure in both countries has stalled any further progress.

While this thesis focuses on Syria and Iraq, the regional community plays a big role in the availability of water in these countries. With 78 percent of Syria's water and 61 percent of Iraq's water originating from outside the states' borders, regional cooperation is necessary (Shamout, 2015). Because both the Euphrates and Tigris Rivers originate in Turkey, the country maintains a strong hold on the water supply in the region (Majdalani et al., 2013). Similar to the agreements between Iraq and Syria, current legislation exists to address the issue of water allocation from Turkey to its neighbors. In 1946, Iraq and Turkey signed the Treaty of Friendship and Good Neighbourly Relations where Turkey agreed to record and share water flow measurements as well as inform Iraq about any water development projects (Majdalani et al., 2013). In 1987, Syria and Turkey signed the Protocol on Economic Cooperation that guarantees an annual flow of 500 cubic meters per second from the Euphrates River into Syria (Majdalani et al., 2013). For years the Euphrates flourished sending water flowing from Turkey to Syria at approximately 720 cubic meters per second, estimated to be one third of the rivers annual flow (Jabbari, Ricklefs & Tollast, 2015). In 2009, Syria and Turkey attempted to address impending water shortages by signing the Syrian-Turkish Strategic Cooperation Council Agreement, which stated that water was a primary issue facing both countries and also made commitments to improved water infrastructure (Majdalani et al., 2013). Since that 2009 agreement there have been 40 additional memorandums passed between the nations in an effort to mediate the problem

(Jabbari et al., 2015). Unfortunately, a combination of climatic variables, non-state actors interference, and the development of water infrastructure in Turkey has reduced the effectiveness of past diplomacy. Water flow from the Euphrates River from Turkey has depleted to 260 cubic meters per second by the time it reaches Iraq (Jabbari et al., 2015). While impacting immediate water availability in Syria and Iraq, the lack of water is contributing to the drying of the Iraqi Marshes on the southern tip of the country. Water must flow at a minimum of 90 cubic meters per second through the southern Iraq in order to sustain the marshes; today the water is flowing at 18 cubic meters per second (Jabbari et al., 2015). Iraq and Syria are demanding Turkey release more water to meet their international agreements and help Syria and Iraq meet their minimal needs.

In the 1960s, Turkey began formulating the Southeastern Anatolia Project, or GAP as it is commonly referred to as (Majdalani et al., 2013). The project aims to increase sustainability and productivity throughout Turkey by developing the country's dams and hydroelectric plants along the Tigris and Euphrates Rivers (Majdalani et al., 2013). Turkey committed an estimated \$35.5 billion to build a total of 22 dams and 19 hydroelectric stations along the rivers (Majdalani et al., 2013). GAP aims to provide irrigation for an additional 1.7 million hectares and is estimated to produce 55 billion kilowatt hours of energy a year (Majdalani et al., 2013). In 1992, one of the first GAP projects, the Ataturk Dam located on the southern end of Turkey 80 km from the Syrian border, was completed (Majdalani et al., 2013). The Ataturk Dam is one of the largest dams in the world and its reservoir, Lake Ataturk is the third largest lake in Turkey with a maximum capacity of 48,7000 MCM (Majdalani et al., 2013). Since its completion, the Ataturk Dam has been depleting the amount of water flowing from Turkey to Iraq (Majdalani et al., 2013). Turkey continues to make claims that the reduction is temporary or an effort to cut off

water supplies to the self-proclaimed Islamic State that control the downstream territory, however, Iraq is already experiencing a third less water flow (Jabbari et al., 2015). While there are only six dams left to be completed as a part of GAP, once constructed it is estimated that water flow to Iraq will decrease an additional eighty percent, with the Ilisu and Cizre Dams making up fifty percent of that decrease (Jabbari et al., 2015). Countries such as Austria, Germany, and Switzerland have pulled their support for the project due to the impacts they will have on Iraq (Jabbari et al., 2015). Moreover, between 1975 and 1991 Syria and Iraq have threatened military intervention against Turkey three times in relation to GAP (Jabbari et al., 2015). In addition to the tensions between these regional state actors, non-state actors such as the Kurdish Workers Party that occupy Northern Iraq and the self-proclaimed Islamic State have also blamed and threatened Turkey over the water shortages in their region (Jabbari et al., 2015). Despite the lack of international support and rising tensions, Turkey has continued with preparation for construction of the dams (Jabbari et al., 2015).

Water in Syria. While the Euphrates and Tigris Rivers supply half of the country's water, there are other water sources and infrastructures that are important to note. The Orontes River flows through Turkey and Lebanon into the Orontes River Basin in north-western Syria (Hashim, 2014). The basin is home to about 4.2 million Syrians and is one of the largest sources of water for the country, contributing 20 percent of the nation's water supply (Hashim, 2014).

As mentioned above, severe droughts led to massive crop failures that devastated the country. The agriculture sector makes up 25 percent of Syria's GDP and employs 40 percent of their population (Erian, Katlan & Babah, 2010). Prior to the drought beginning in 2000, 67 percent of all agriculture in Syria relied on rainfall, not irrigation (Erian et al., 2010). This reliance in the midst of an extended drought combined with mismanagement of water by the

Assad Regime led to 75 percent of homes crop to fail (Erian et al., 2010). Production of non-irrigated wheat fell 82 percent with overall wheat production falling 47 percent while barley production fell 67 percent below pre-2000 levels (Erian et al., 2010). In addition to crop failure, the water conditions devastated the country's livestock, killing about 7 million (Erian et al., 2010). Because farmers were unable to feed or provide water for them, livestock fell 60-70 percent below average cost (Erian et al., 2010). The impacts of the water shortage devastated the farming populations within Syria, forcing approximately 1.5 million farmers and their families to flee their homes in search of work and resources (Jabbari et al., 2016). Jihadist groups such as the self-proclaimed Islamic State were able to exploit the situation by recruiting thousands of farmers, offering them stability as well as supply of food and water (Jabbari et al., 2016). Those who were not recruited migrated to urban region of the country, leading to significant and unsustainable population increases areas that were already facing water shortages and political tensions (Majdalani et al., 2015). As these tensions amongst migrated farmers and urban residents against the Assad Regime began to rise; some of their first demands were not the fall of the Regime, but a demand for clean water (Majdalani et al., 2015) Despite the rising protests and conflicts, this demand for clean water was repetitively denied or ignored (Jabbari et al., 2016). These tensions peaked in March of 2011 when the Arab Spring arrived in Syria and the Syrian revolution began (Jabbari et al., 2016). Many experts cite the water scarcity as one of the biggest contributing factors to the conflict.

In addition to the drought, water infrastructure and management within the country is contributing to the crisis. The Assad Regime permitted unnatural and illegal manipulation of water resources throughout the country. Prior to 2011, the Assad Regime aimed to mitigate international scrutiny and placate internal tensions by targeting the issue of food scarcity within

the country. This led to a lack of oversight and regulation of water allocation; during this time water that was intended for drinking was illegally being diverted to support agriculture (Hammer, 2013). Syrian water infrastructure is also significantly contributing to the water crisis. The International Committee of the Red Cross estimates that cracks in water pipes has contributed to 60 percent loss of water throughout the country (Hammer, 2013). Additionally, constant conflict in the streets of the country has led to a destruction of water infrastructure, including pipes and water pumps (Hammer, 2013). The conflict also prevents engineers from being able to mend and maintain the water infrastructure (Hammer, 2013).

Since the Syrian conflict began in 2011, water has become increasingly scarce. UNICEF projects that there are 5 million Syrians without access to reliable drinking water as a result of water availability being 50 percent of what it was prior to the uprisings (Al-Masri, 2015). Water prices significantly increased, in some areas such as Aleppo increasing as much as 3,000 percent (Al-Masri, 2015). Aside from the availability of water, quality of water has become an increasing concern in the region. In 2012, as an act of retaliation against areas that did not support his regime, Assad discontinued water treatment, such as chlorination in most of the country (Sparrow, 2014). This led to thousands of gallons of raw sewage water being dumped back into the Euphrates River without any regulation or treatment (Sparrow, 2014). Due to the scarcity of water, thousands of Syrians are only able to find water at the main source, the Euphrates, exposing thousands of Syrians to bacteria and diseases (Sparrow, 2014).

In addition to this deconstruction of water treatment, Assad also targeted the nation's health care system. Starting in 2012, the regime will no longer supply communities who are against the regime with vaccinations or health care treatment (Sparrow, 2014). 652 health care facilities have been destroyed or decommissioned since 2011, and doctors who try to aid areas

that are against the regime are targeted by snipers and militia (Sparrow, 2014). According to the World Health Organization, vaccination rates in Syria have fallen from 83 percent in 2011 to 52 percent, leaving three million children vulnerable to diseases (Sparrow, 2014). This purposeful neglect for sanitation and health care has led to the spread of water borne diseases throughout the country. In 2009, the World Health Organization announced an outbreak of cholera within Syria (Jabbari et al., 2015). Cholera is contracted through exposure to fecal matter in untreated water and is easily spread (Jabbari et al., 2015). The World Health Organization has identified 7,600 cases, although the number is thought to be a low estimate due to the minimal access they have to regions controlled by the Syrian Government and non-state actors such as the self-proclaimed Islamic State (Sparrow, 2014). Moreover, in 2014, the World Health Organization along with other non-governmental organizations declared an outbreak of the poliomyelitis virus, or polio in Syria (Sparrow, 2014) Polio is a disease that was eradicated in the western hemisphere in 1991 and by 2012 had been isolated the about 200 cases in three countries (Sparrow, 2014). Polio is primarily contracted orally by consuming fecal matter (Sparrow, 2014). Oral contraction is usually a result of consuming unclean water, but can also be contracted through the legs of flies in overcrowded and unsanitary areas such as the conditions are in Syria (Sparrow, 2014). The Syrian Government has refused to acknowledge the outbreaks attributed to the water crisis and has denied the World Health Organization permission to aid those who have contracted water-borne illnesses or test and decontaminate the water supplies in the county (Sparrow, 2014).

Water in Iraq. As explained previously, the Tigris and Euphrates Rivers are critical to the survival of Iraq. While water demand in Iraq is an estimated 66.8 billion cubic meters, supply remains at 43 billion cubic meters and is projected to decline to 17.61 billion cubic meters by the end of this year (Majdalani et al., 2015). Iraq's water shortage can be attributed to prolonged

drought, mismanagement of current resources caused by nationally deteriorating water infrastructure and outdated irrigation methods, as well as aggressions by non-state actors throughout the country. As a result of the natural and anthropogenic manipulation in the region, the Pfister Water Stress Index has categorized Iraq “extremely stressed” at .974 out of 1 (Jabbari et al., 2015).

One of the biggest concerns facing Iraq right now is the Mosul Dam. The Mosul Dam is located on the Tigris River near the border of Iraq and Syria; it is the largest dam in the country standing 131 meters tall with a reservoir capacity of 12,5000 million m³ (Food and Agriculture, 2008). The Mosul Dam, previously named the Saddam Dam, was built by former President Saddam Hussein in 1984 (Majdalani et al., 2015). While the Mosul Dam was originally built as a symbol of strength, it soon became a primary source of water for irrigation, drinking water, flood control, and electricity (Lossow, 2016). Today, the dam provides 45 percent of the nation’s electricity and powers major cities such as Mosul and Baghdad (Borger, 2016). From its inception, many chief engineers assigned to the project, such as Nahnir al-Ansari, had concerns about viability of the dam’s location (Borger, 2016). The dam was built on a foundation of gypsum, anhydrite, marl, and limestone, layers of highly soluble minerals (Borger, 2016). As the engineers had warned, these foundational materials have led massive leaks that began in 1986, only a few years after its completion (Borger, 2016). The unstable foundation has led to leaks, sinkholes, caves, and cracks that release water into the foundation, eroding the layers of gypsum (Borger, 2016). This erosion poses a severe threat to the viability of dam thus requiring constant monitoring and repair; until 2014, the Mosul Dam had 600 employees, 300 of which were engineers delegated to ensuring the integrity of the foundation (Borger, 2016). These highly skilled engineers worked 24 hours a day monitoring and detecting sources of leaks and erosion

(Borger, 2016). Once detected, the engineers would then fill the cracks, sink holes, or caves with cement in order to keep the dam from collapsing (Borger, 2016). Without this constant maintenance, the Mosul Dam will collapse releasing the 11 cubic meters of water held behind its walls (Borger, 2016). It is because of this foreseen threat the United States Army Corp of Engineers described the Mosul Dam as the “most dangerous dam in the world” (Borger, 2016).

To combat the threat of a massive flood in the event that the Mosul Dam did collapse, a secondary dam was to be constructed down the river to protect the populations such as Mosul and Bagdad (Borger, 2016). The dam, known as the Budish Dam, was under construction during the Gulf War, and as a result of the international sanctions imposed on Iraq during the first Gulf War, the engineers were unable to acquire the materials necessary to complete the project (Borger, 2016). Even after the sanctions were lifted, construction of the dam never resumed and today remains only 40 percent complete (Borger, 2016). Moreover, at the time of its construction, the Mosul Dam had natural conduits that would capture water in the event of a flood; however the construction and development of the land destroyed these channels, leaving the area even more exposed to a flood (Borger, 2016).

In addition to the threat of a massive flood, the erosion of the Mosul Dam’s foundation is also impacting the water quality of the Tigris River (Borger, 2016). As the layers of the gypsum foundation are dissolved, high levels of chemicals such as calcium and sulfate are being released into the river (Borger, 2016). Without restoring the nation’s crumbling water filtration system, these high level of chemicals will continue to be consumed by Iraqis downstream and build up and lead to the destruction of the river ecosystems (Borger, 2016).

While the Mosul Dam poses the most immediate and large scale threat to Iraq, the rest of the country’s internal water infrastructure is continuing to deteriorate. Prior to the Gulf War, Iraq

had a fairly stable national water infrastructure. During the Gulf War, however, a significant portion of this infrastructure was destroyed in airstrikes and fighting; specifically, 90 percent of the country's electricity grid was destroyed during the Gulf War and since then only 65 percent of it has been restored although still in need of modernization (United Nations, 2003). This damage to the country's national power grid had significant impacts on the water sanitation of the country. Due to the fact that water sanitation and treatment requires electricity, national blackout created by the destruction led to raw sewage water being released back into the Euphrates and Tigris Rivers (United Nations, 2003). While improvements have been made, the country has yet to fully recover. Today, only 18 percent of water is completely treated before being let back into the rivers (United Nations, 2003). This has led to one in five homes still don't have a supply of clean water, with 16 percent experiencing supply problems (United Nations, 2003). In 2003 during the United States occupation of Iraq, the U.S. aimed to allocate \$2.5billion to restoring the water infrastructure in the country; however, the money was ultimately only allocated to areas with United Nations or humanitarian organizations' presence, neglecting the areas that were in desperate need of water such as the rural communities where only 43 percent of areas have access to water (United Nations, 2003).

The destruction of the Gulf War still lingers in Iraq's water infrastructure partially due as a result of the sanctions placed on the country at the time. The international sanctions prevented Iraq from being able to repair the water pumps, pipes, and electricity grid necessary to improve their water treatment and distribution system (Johal, 2015). It is estimated that at least 80 percent of Iraq's pipelines are still in need of restoration (Johal, 2015). The impacts of this destruction are still seen today; Iraq's water quality does not meet Iraqi National Standards for Water Quality nor the World Health Organization's guidelines (United Nations, 2003). The lack of

water quality has led to several water borne illness outbreaks throughout the country. In 2011 over a million Iraqis were hospitalized for diarrhea which led to 350 fatalities (Johal, 2015). The lack of water filtration disproportionately impacts vulnerable populations including children and the elderly. It is estimated that children ages three and younger suffer from fourteen episodes of diarrhea a year (Johal, 2015). Moreover, in 2012, 426 cases of cholera were reported in Suleimaniyah and Kirkukin (Johal, 2015).

Water shortages are also significantly impacting various economic sectors within the country including oil production. Iraq has the second largest oil reserves in the world, behind Saudi Arabia (Nakhle, 2015). Oil is integral to the Iraqi economy, comprising 95 percent of the nation's national revenue (Schwartzstein, 2015). Iraq requires 1.8 billion cubic meters of water a year to sustain their oil extraction, and while some private oil companies in the northeastern region are able to supply their own water, many are facing shortages (Schwartzstein, 2015). Two of the largest oil fields in the country are experiencing production loss as a result of the national water shortage (Nakhle, 2015). West Qurna-1 has experienced a 40 percent decline in oil production while Zubain has experienced decline in production as well, however will not publicize their losses (Nakhle, 2015). The lack of water to produce oil combined with the production loss from oil fields and pipelines that are under the control of the self-proclaimed Islamic State, has led to an increase in gas prices within Iraq from 70 cents to \$1.70 (Nakhle, 2015). National rations and restricted hours for gas stations have been implemented in order to cope with the oil shortage within the country (Nakhle, 2015).

Agriculture has also taken its toll on the water resources within the country. The primary problem is that the country is using an ancient irrigation practice known as Sumerian Flood Irrigation (Schwartzstein, 2015). Flood irrigation is a wasteful method of irrigation that also has

a significant impact on the quality of the soil (Schwartzstein, 2015). Flood irrigation practices result in salt being lifted from the soil and washed back into the waterways as runoff leading to an increase in the salinity of the soil (Schwartzstein, 2015). The salinity has made the soil unfertile, particularly in the Southern region of the country at the Shatt al-Arab basin where salinity levels are particularly high (Schwartzstein, 2015). Due to the deterioration of the marshlands from the 1990s, the Shatt al-Arab basin lacks any natural filtration system, unable to repair the soil (Majdalani et al., 2013). These high levels of salinity in the soil have forced at least two towns with a combined population of 6,000 to relocate (Majdalani et al., 2013). While the Iraqi government has identified Sumerian flood irrigation as a problem, their attempts to introduce more efficient irrigation practices such as drop irrigation have failed (Jabbari et al., 2015). One reason is that farmers are not receiving the training or the materials necessary to transition (Jabbari et al., 2015). These are some additional residual impacts of the sanctions that were placed on the country during the Gulf War; similar to how they were unable to purchase materials for their water infrastructure, Iraq was also unable to purchase the materials necessary to improve their irrigation and therefore continued to degrade their arable land.

The Iraqi government has tried to mitigate the water shortage through policy. For example, they have prohibited rice farming in the marshlands due to how water intensive the crop is (Majdalani et al., 2013). Additionally, the government has reduced the hours that electricity is available (Majdalani et al., 2013). The government has also tried digging extra wells and bores for their citizens; while it may presently mitigate water shortages, their construction will also significantly deplete the water tables of the country (Majdalani et al., 2013).

Similar to how President Assad manipulated water allocation and sanitation in Syria, Saddam Hussein used similar tactics to terrorize population in southern Iraq (Al-Masri, 2015).

Throughout his reign in the 1990's, Saddam Hussein targeted water resources diminishing access to clean water to thousands of Iraqis that didn't support him (Al-Masri, 2015). In order to target Shi'ite populations in the southern region of Iraq, Hussein drained marshes of water including the Chibayish and Dhi Qar Marshes near Nasiriyah that covered 15,000-20,000 square miles of land (Al-Masri, 2015). Hussein was able to drain an estimated 90 percent of the water within these marshes (Scammell, 2015). Al Hammar, the central area of the marshes in southern Iraq were drained 94-97 percent during this assault on the region (United Nations, 2003). This compounded with the climatic conditions created a severe crisis for the region (Scammell, 2015). The Tribes of Southern Iraq not only relied on this water for their drinking water, but also on the ecosystems the marshes sustained (Al-Masri, 2015). Water Buffalo and fish found within these ecosystems were the main sources of food for the region (Al-Masri, 2015). Draining the marshes left the tribes without clean drinking water, food, and crippled their economy (Al-Masri, 2015). Moreover, this led to an outbreak of Cholera within the area (Al-Masri, 2015).

The ecosystems have never fully recovered from the drainage. The tributaries of the Euphrates River are no longer meeting the marshes at the Shatt al-Arab basin (Scammell, 2015). This has had a few implications for the area; the marshes have not been able to be restored, almost eliminating the natural filtration of runoff during precipitation before it washes into the Gulf which is threatening fish populations within the Persian Gulf (Scammell, 2015). With the lack of fish, water buffalo, and potable water in the region, forcing 90 percent of Marsh Arabs have been forced to migrate to urban areas (United Nations, 2003). As a result, 75 percent of Iraqis live in urban areas; and similar to Syria, this massive influx of populations in urban areas has significantly stressed the water and electricity resources of those cities (United Nations, 2003).

The self-proclaimed Islamic State and Water in Syria and Iraq; Control of Dams

The self-proclaimed Islamic State is focused on establishing a self-sustaining nation-state, or caliphate, in the region of the Middle East. It is for this reason that the self-proclaimed Islamic State has also targeted water infrastructure within Iraq and Syria. The organization understands that the political scenarios in Iraqi and Syrian, although largely agitated by their presence, have left millions without reliable sources of water. The self-proclaimed Islamic State is seizing critical water systems in the area, allowing them to sustain their oil production and economic stability, have water for drinking and irrigation, offer as a recruitment tool, as well as terrorize the populations who resist their presence.

Tishrin Dam, Syria. The self-proclaimed Islamic State began their campaign to control water in November of 2012 when they took over the Tishrin Dam along the Euphrates River in Syria (Borger, 2016). The Tishrin Dam, built in 1999, is located Northern Syria east of the city of Aleppo (Food and Agriculture, 2008) The dam is 40 meters tall and has a reservoir capacity of 1883 million m³ (Food and Agriculture, 2008). The Tishrin Dam has 630 megawatt of hydropower capacity and supplies electricity and water to Northern Syria and Syria Kurdistan (ISIS Blocking, 2015). During the occupation of the self-proclaimed Islamic State in 2012, the people of Tishrin were forced to join the group or flee; while most fled the city the militia began planting explosives, trapping citizens in the town, forced to join or die (ISIS Blocking, 2015). The militia closed the dam, shutting the water supply to downstream cities and causing widespread blackouts. The self-proclaimed Islamic State reportedly then turned the dam into a jihadist training facility (ISIS Blocking, 2015).

Tabqa Dam, Syria. In February 2013, the self-Proclaimed Islamic State captured the Tabqa Dam, also known as the Euphrates Dam, located 40 kilometers west of Raqqa in Syria on

the Euphrates River (Waslekar, 2015). The Tabqa Dam, completed in 1973, was built for irrigation and hydropower (Food and Agriculture, 2008). The dam is 60 meters tall and 3 miles long with 12,000 million m³ reservoir capacity (Food and Agriculture, 2008). The Tabqa Dam is the largest dam in Syria and the largest earth-filled dam in the world (Shamout, 2015). The dam supplies water to 5 million people and can produce 824 megawatt of hydropower for the area including the cities of Aleppo and Raqqa, two large cities under the self-proclaimed Islamic State's control (Lossow, 2016). Because the Tabqa Dam provides electricity for territory under its control, rather than shutting off the power, the self-proclaimed Islamic State increased the dam's electricity production (Lossow, 2016). By May 2014, the increase in electricity production combined with the lack of proper training to operate and maintain the dam amongst the militants led to a significant six meter drop in the dam's water reservoir, Lake Assad (Lossow, 2016). Moreover, in response to territorial advancements by the self-proclaimed Islamic State, it is reported that Turkey purposely closed the Ataturk Dam at the border of Turkey and Syria in order to reduce water supplies to Aleppo and thereby the self-proclaimed Islamic State (Waslekar, 2015). These events reduced that water flow through the Tabqa Dam to a point that the turbines were unable to run, eliminating electricity generation and causing blackouts to the surrounding area (Lossow, 2016). The low water flow also prevented water pumps to operate and decreased ground water levels, leading to massive water shortages in areas such as Aleppo (Lossow, 2016). The reduced water flow also caused water pipes to be filled with mud and river plants, blocking the already limited flow of water (Paletta, 2016). The limited water flow also impacted the Haditha Dam, located downstream, shutting down many of its electricity generators as well (Paletta, 2016).

The reduced water flow was worsened when the self-proclaimed Islamic State began periodically closing the dam, almost eliminating the amount of water flowing downstream through the Anbar Province (Waslekar, 2015). In response to the actions of the self-proclaimed Islamic State, an Anbar Provincial Council member released a statement asking the international coalition opposing the self-proclaimed Islamic State to conduct air strikes on the dam in order to allow water to flow through the dam (Paletta, 2016). Airstrikes could potentially contaminate the already scarce water, or could destroy the dam, triggering a major flood displacing those downstream. In reaction to the call for airstrikes, the self-proclaimed Islamic State released a statement that the organization had planted explosives along the dam and threatened to detonate them if any actors were to attack the dam (Shamout, 2015). If the dam were to break, by the hand of the self-proclaimed Islamic State or actors trying to combat the group, 11 million m³ of water would be released threatening the lives of 3 million people in Syria and Iraq (Shamout, 2015).

The self-proclaimed Islamic State has also utilized the Tabqa Dam as a safe hold. Since its capture in 2013, the organization has used the dam to hide valuable hostages as well as high ranking self-proclaimed Islamic State officials (Paletta, 2016). In contrast to some other areas that have been reclaimed by Iraqi, Kurdish, and Syrian militia, the area around the Tabqa Dam lacks any allies to aid in the fight against the self-proclaimed Islamic State (Paletta, 2016).

Baath Dam, Syria. In the same month, February of 2013, the self-proclaimed Islamic State also took over Baath Dam located downstream from the Tabqa Dam in Syria, along the Euphrates River (Lossow, 2016). The Baath Dam, completed in 1987, was built to regulate flow from the Tabqa Dam upstream (Shamout, 2015). The dam is 14 meters high and has a reservoir capacity of 90 million m³ (Food and Agriculture, 2008). The Baath Dam provides 60 percent of Syria's water supply and produces hydropower max capacity of 81 megawatt (Lossow, 2016).

The dam provides water to the city of Raqqa, the self-proclaimed capital of the self-proclaimed Islamic State's territory (Lossow, 2016). The self-proclaimed Islamic State controls a majority of the area around Raqqa including a majority of the Deir Az-Zor area located just south of Raqqa, below the Baath Dam (Shamout, 2015). Deir Az-Zor remains a contested area and in January of 2015, the self-proclaimed Islamic State shut off all power and electricity to the area, impacting 300,000 people in an already vulnerable region (Hollander, 2015). The conflict has destroyed a reported 90 percent of water treatment facilities and water pipes, forcing people to drink from puddles and risk illness for water (Shamout, 2015). Alternatively, because the self-proclaimed Islamic State needs the water and electricity to sustain their territories in the area, the chance that the organization will destroy the dam all together is relatively low; although this could change as the Iraqis and opposition in Syria continue to retake more land.

Hamrin Dam, Iraq. From August of 2013-September 2014, the self-proclaimed Islamic State reported gaining control of the Hamrin Dam, also known as the Diyala Dam, located in the Diyala Province in northeastern Iraq, 50 km from the city of Baquba (Shamout, 2015). The dam was completed in 1980 and stands 40 meters high supporting its reservoir, Lake Hamrim, which has a maximum capacity of 4,000 million m³ (Food and Agriculture, 2008). The self-proclaimed Islamic State closed the dam which blocked water supplies for the Shiite city of Balad Ruz (Shamout, 2015). The people of Balad Ruz responded by trying to drill their own wells and establish temporary desalination stations; unfortunately without the right equipment and training, the people were unable to secure clean water this way (Shamout, 2015). In September of 2014, as the Iraqi forces regained territory near Hamrin Dam, the self-proclaimed Islamic State militia purposely diverted water to flood surrounding land and force the Iraqi forces to retreat (Shamout, 2015). The flooding impacted nine villages including at least 60 homes and 200 acres of

farmable land (Shamout, 2015). Although the flooding delayed the liberation, the dam was retaken by Iraqis later that month (Shamout, 2015).

Fallujah Dam, Iraq. In January of 2014, the self-proclaimed Islamic State took control of Fallujah Dam, also known as the Nuaimiyah Dam located near the city of Fallujah. Iraq on the Euphrates River (Lossow, 2016). Once captured, the organization immediately closed the dam, and used the Fallujah regulator to divert water into the Abu Ghraib irrigation channel along the river (Lossow, 2016). In addition to withholding water from the Shi'ite populations in downstream areas, by April of that year the Abu Ghraib irrigation channel reached its capacity, flooding the surrounding Sunni-majority populations (Lossow, 2016). The manipulation of water from the Fallujah Dam impacted 49 villages and major cities including Karbala, Najaf, Babylon and Nasiriyah (Lossow, 2016). The flood destroyed 200 square kilometers of fertile farm land killing an entire harvest, destroyed 10,000 homes, displaced 260,000 people, and left 10 million without water (Threat of Disease, 2014). A member of the Ministry of Water called the events of the Nuaimiyah Dam a "crime against humanity" for purposely depriving humans of a basic necessity and human right (Threat of Disease, 2014).

The self-proclaimed Islamic State originally closed the flood gates of the dam not only to terrorize the Shi'ite populations downstream, but also as a military strategy. When the organization originally closed the gates, the flooding upstream forced Iraqi troops were forced to retreat (Lossow, 2016). A few days later, the self-proclaimed Islamic State then opened the flood gates in order to protect their territory from Iraq troops advancing from downstream (Lossow, 2016). The Iraqi Government responded to the situation by opening Haditha Dam, located upstream from Fallujah Dam in an attempt to pressure the self-proclaimed Islamic State to open the flood gates and allow water to flow through the region (Lossow, 2016). While the Iraqi

Government was successful, the additional water pressure flowing from Haditha Dam worsened the flooding downstream, adding to the damage and displacement (Lossow, 2016).

Millions of Iraqis were impacted by the diversion of water at the Fullujah Dam. While it devastated crops and water supplies, the flooding also interrupted the elections held on April 30, 2014; as a result of the flooding, one third of the polling locations in Anbar Province were unable to open for the elections (Threat of Disease, 2014). This created a devastating problem for a country that was building a new and vulnerable government. The democracy was only going to be able to survive if the Iraqi citizens felt as though they were able to have their voices heard and having polling locations unable to open as a result of the actions of non-state actors threatened the country's young democracy. It was a sign that the non-state actors would be able to prevail over the voices of the people, the democratically elected government, and the actions of the peaceful.

Samarra barrage, Iraq. In July 2014 the self-proclaimed Islamic State took control of a couple water structures on the Tigris River in Iraq. One was the Samarra barrage located in northern Iraq just west of the city of Samarra (Shamout, 2015). The barrage was built to provide irrigation, electricity, and store water; the barrage divert water from the Tigris to Lake Tharthar reservoir, through the Tharthar Canal and into to the Euphrates River (Shamout, 2015). The self-proclaimed Islamic State manipulated the water, cutting off water and electricity to the nearby areas (Shamout, 2015).

Sudur mini-Dam, Iraq. In the same month, the self-proclaimed Islamic State was also able to gain control of the Sudur mini-Dam, located below the Samarra barrage on the Tigris River (Shamout, 2015). As with the conflict at Hamrin Dam, the city of Balad Ruz's water supply was cut off (Shamout, 2015). The self-proclaimed Islamic State also reportedly planted

explosives along the dam; even after the Iraqi forces retook to dam in January of 2015, the dam remained closed until it could be secured by Iraqi officials, forcing the government to bus in water for the people of Balad Ruz (Shamout, 2015).

Mosul Dam, Iraq. On August 7th 2014, the self-proclaimed Islamic State took over the Mosul Dam and the international community immediately responded; countries including the United States and Iran provided air support for the Kurdish and Iraqi forces on the ground (Shamout, 2015) While it only took eleven days to reclaim the Mosul Dam, the damage had already been done. While under the control of the self-proclaimed Islamic State, most of the engineers who would maintenance the dam at all hours of the day and operate the dam fled (King, 2016). While the self-proclaimed Islamic State tried to recruit their own engineers to operate the dam and keep up with the grouting, they were unable to sustain the daily maintenance necessary to maintain the foundation of the dam (King, 2016). While struggling to operate the dam, the militants ceased the purification of water, purposely trying to poison the Christian populated Qaraqosh Bartalla downstream (King, 2016).

Once reclaimed by the Iraqis and Kurds less than a week later, of the 300 engineers who once oversaw the grouting of the foundation, less than 30 returned (Shamout, 2015). Even if more engineers were to return, the grouting equipment and cement supplies were stolen, making it impossible to keep up with the maintenance of the dam (Shamout, 2015). Moreover, while the self-proclaimed Islamic State did not purposely inflict damage to the dam, the foundation was significantly weakened and many officials within Iraq and in the global community are expecting the worse.

In order to reverse the damage, the Iraqi government recently approved a \$380 million contract with an Italian company, Trevi, to repair the dam (Atwan, 2015). There are many factors

that may inhibit the company's success; for one, the area is still near conflict torn areas and territories claimed by the self-proclaimed Islamic State (Johal, 2015). Additionally, fully repairing Mosul Dam would require breaking down parts of the dam which would require having control of Mosul (King, 2016). As of today, the self-proclaimed Islamic State still has control of the city of Mosul, thereby inhibiting the reconstruction of the Mosul Dam (King, 2015).

Haditha Dam, Iraq. While they have gained control of several key water infrastructures, the self-proclaimed Islamic State has been unable to overtake the Haditha Dam located in the western region of Iraq (Lossow, 2016). The importance of this Dam has been apparent to many militias through the past decade; in 2003 when the United States invaded Iraq, one of their first targets was to gain control of the Haditha Dam (Lossow, 2016). The Haditha Dam produces 30 percent of Iraq's electricity and is the second largest generator of hydroelectric power in the country with a capacity of 660 megawatt of hydropower (Lossow, 2016). The self-proclaimed Islamic State claims territories around the dam and as previously mentioned, has launched a steady assault on the dam for over 18 months trying to penetrate the Iraqi stronghold (Lossow, 2016).

Ramadi Dam, Iraq. In May 2015, the self-proclaimed Islamic State took control of the Ramadi Dam, built in 1951 on the Euphrates River near the city of Ramadi, the capital of the Anbar province in central Iraq (Lossow, 2016). Once they took control, the organization closed the dam, diverting the water to the dam's reservoir, Lake Habbaniya (Lossow, 2016). Unlike other scenarios where the organization would close a dam to purposely flood an area, here they diverted water so that they could traverse across the river bed to attack nearby towns including Husaybah, Khalidiyah, and the Habbaniya Military base (Lossow, 2016). Once a day, the self-proclaimed Islamic State would open 3 of the dams 26 flood gates to prevent their own territory

from flooding (Lossow, 2016). Since the organization took over the Ramadi Dam, the Euphrates River flow has declined 50 percent from its usual flow of 200 cubic meters per second (Lossow, 2016). Moreover, the people of Babil, Karbala, Najaf, and Qadisya were left without a reliable water supply.

Marshes, Iraq. Similar to regime of Saddam Hussein, the self-proclaimed Islamic State has also drained the marshes in the southern end of Iraq (Micangeli, Grego & Esposto, 2013, pp. 211-245). Since the previous devastation to the ecosystem in 1991, the marshes have only recovered 10 percent of their original levels; water sometimes does not even make it to the Gulf (Micangeli et al., 2013). It is estimated that 60 percent of the fish consumed in Iraq originates from these marshes and gulf; the depleting ecosystem will soon lead to an even greater food shortage throughout the country combined with the dwindling water buffalo populations (Micangeli et al., 2013). Moreover, there are oil reserves within the southern marshes, manipulation of water could hinder the availability of these oil reserves. Either the absence of water in the region could limit the country's ability to extract the oil or further manipulation of the river flow could lead to flooding in region which would submerge future refineries (Micangeli et al., 2013).

Contaminating Water. As was mentioned in the events of Mosul Dam, the self-proclaimed Islamic State has also been contaminating fresh water resources. In the Balad District of Salahaddin Governorate in central Iraq, the organization purposely contaminated drinking water with crude oil (Mamoun, 2014). Moreover, there have been reports that the self-proclaimed Islamic State has also poisoned water within areas in Aleppo, Deir ez-Zar, Raqqa, and Baghdad within Iraq (Mamoun, 2014). There have also been reports that militants are stripping water sanitation facilities of chlorine in order to create chemical weapons (Tilghman,

2015). While also creating a dangerous situation for those fighting the self-proclaimed Islamic State on the ground, it is also further depleting scarce clean water sources.

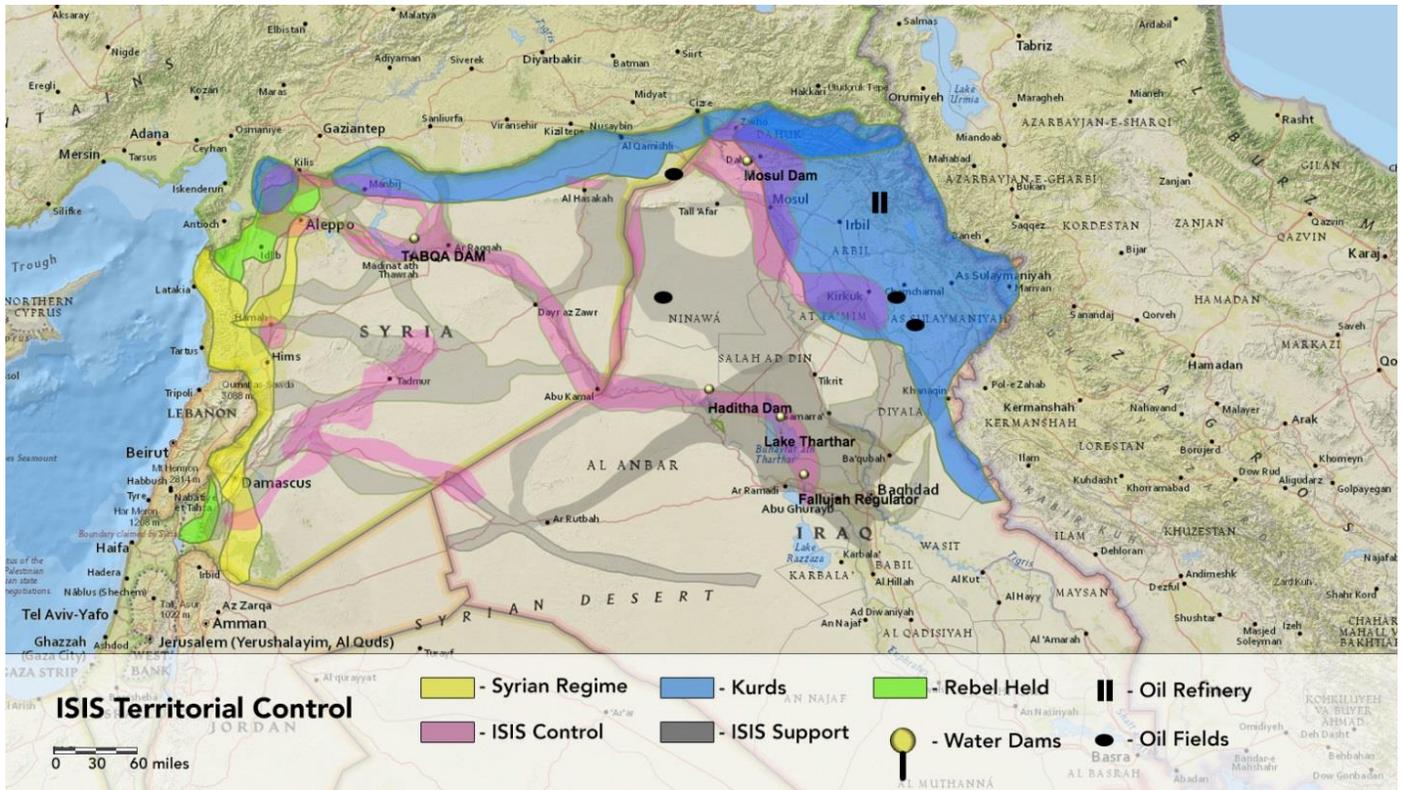
Scenarios

Ultimately, since their campaign began in 2012, there have been 44 reported incidents related to water committed by the self-proclaimed Islamic State (King, 2016). However, this number is just an estimate based on reported incidents. We don't have access some areas within the conflict torn Iraq and Syria and so it is know the degree to which the self-proclaimed Islamic State has exploited this regions natural weakness. Nevertheless, it is clear that the self-proclaimed Islamic State is targeting water resources in Iraq and Syria, for various purposes. These purpose can be categorized as follows: strategic weaponization, tactical weaponization, psychological terrorism, incentivization, and unintentional weaponization (King, 2016) It is through an understanding of the self-proclaimed Islamic State's history, ideology, these categories of purpose, and current territory holds that I propose the following scenarios as possible future movements made by the self-proclaimed Islamic State in Syria and Iraq.

Figure 1 shows the countries of Syria and Iraq. The locations of important water features are displayed and denoted with a yellow tag. Oil fields and refineries were added to show potential locations for contamination and because it is a large income for the organization. The layers of colors depict the territory claims by the governments and non-state actors. The pink color shows the location of the self-proclaimed Islamic State. You can see that their territory follows the two rivers through the region. The self-proclaimed Islamic State also prioritizes water features that are upstream so that they can have optimum control of the water flow to populations downstream. The grey area depicts areas that are contested, in constant conflict, or have populations supportive of the self-proclaimed Islamic State. Yellow is Syria shows areas

that are still governed by the Syrian Regime. Blue shows the location of the Kurds, an important counter-insurgency actor fighting the self-proclaimed Islamic State.

Figure 1. General Geographic map of Iraq and Syria

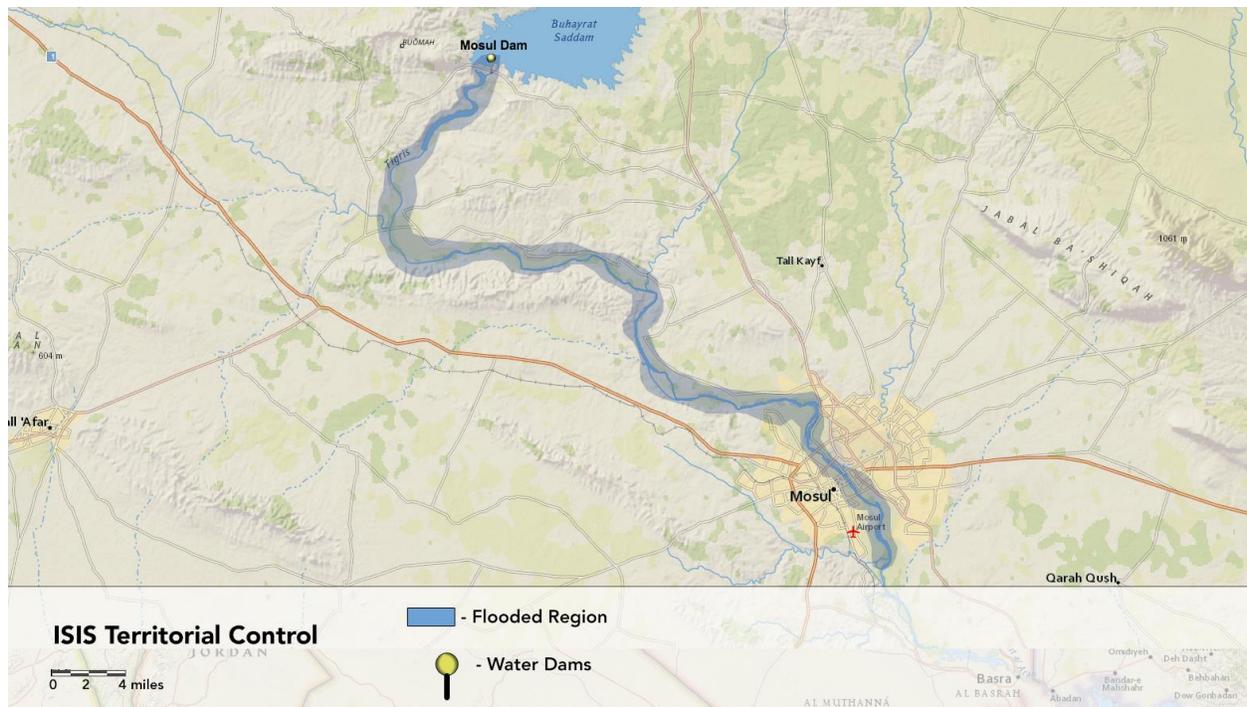


Mosul Dam Scenario. The first scenario is the collapse of the Mosul Dam. There a couple versions of this scenario; the first is that the self-proclaimed Islamic State is able to recapture the Mosul Dam from the Iraqi and Kurdish forces. Because of the dam’s precarious condition, explained above, the United States will not be able to use air-strikes as forcefully as they did before. As explained above, the Mosul Dam requires constant maintenance, maintenance that the self-proclaimed Islamic State is not qualified to administer. As a result of their negligence, the Mosul Dam will collapse. Alternatively, due to the fact that the self-proclaimed Islamic State is losing territory, a more probable scenario might be that the Iraqi troops are able to retake the city of Mosul. The city of Mosul is located just south of the dam.

The self-proclaimed Islamic State wants to control the Mosul Dam so that they can control water to their territories; however, if they no longer have control of the city of Mosul, the organization may shift their water strategy from stabilization and incentivization to weaponization. In this scenario, it is likely that the self-proclaimed Islamic State will plant explosives on the dam as they did with the Sudur mini-Dam, the Tishrin Dam, and the Tabqa Dam. In this scenario, the dam also collapses.

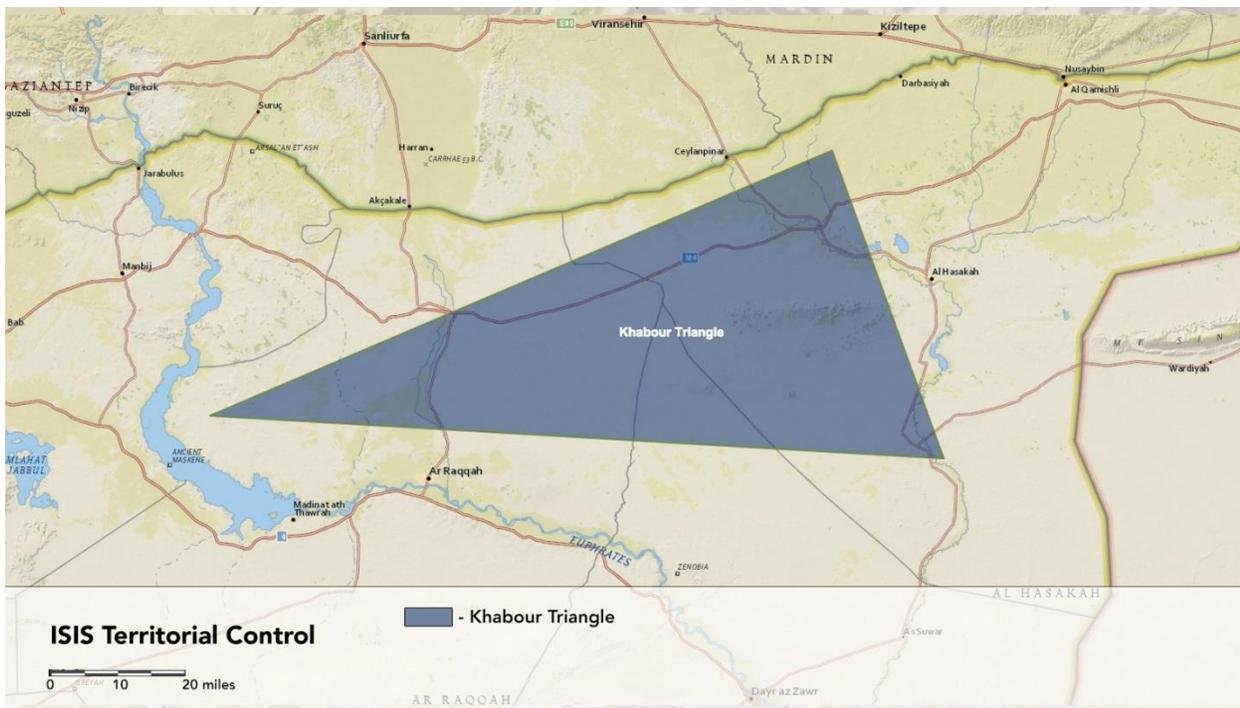
If the Mosul Dam collapses, the 12,500 million cubic meters of water will flood from the reservoir downstream (Borger, 2016). In total impacting one million people along the river flooding the city of Mosul in a number of hours and reaching the capital city of Baghdad within 45 hours (Borger, 2016). The estimated death toll is half a million or more (Borger, 2016).

Figure 2. Mosul Dam Scenario



Khabour Triangle Scenario. Khabour Triangle is located in Syria along the Euphrates River; the Khabour tributary is the largest in Syria, the Khabour Triangle is where several wadis, or seasonal canals, converge. The main wadis in this region are the Wadi Radd, Wadi Khnezir, Wadi Jarrah, Jaghjagh River, Wadi Khanzir, and Wadi Avedji (Majdalani et al., 2013). The self-proclaimed Islamic State has a fairly strong presence in this region of Syria including the Baath Dam and Tabqa Dam located downstream. The self-proclaimed Islamic State would want to control the Khabour Triangle because it is a higher water source upstream; control of this water flow could impact the water levels in their southern territories.

Figure 3. Khabour Triangle Scenario

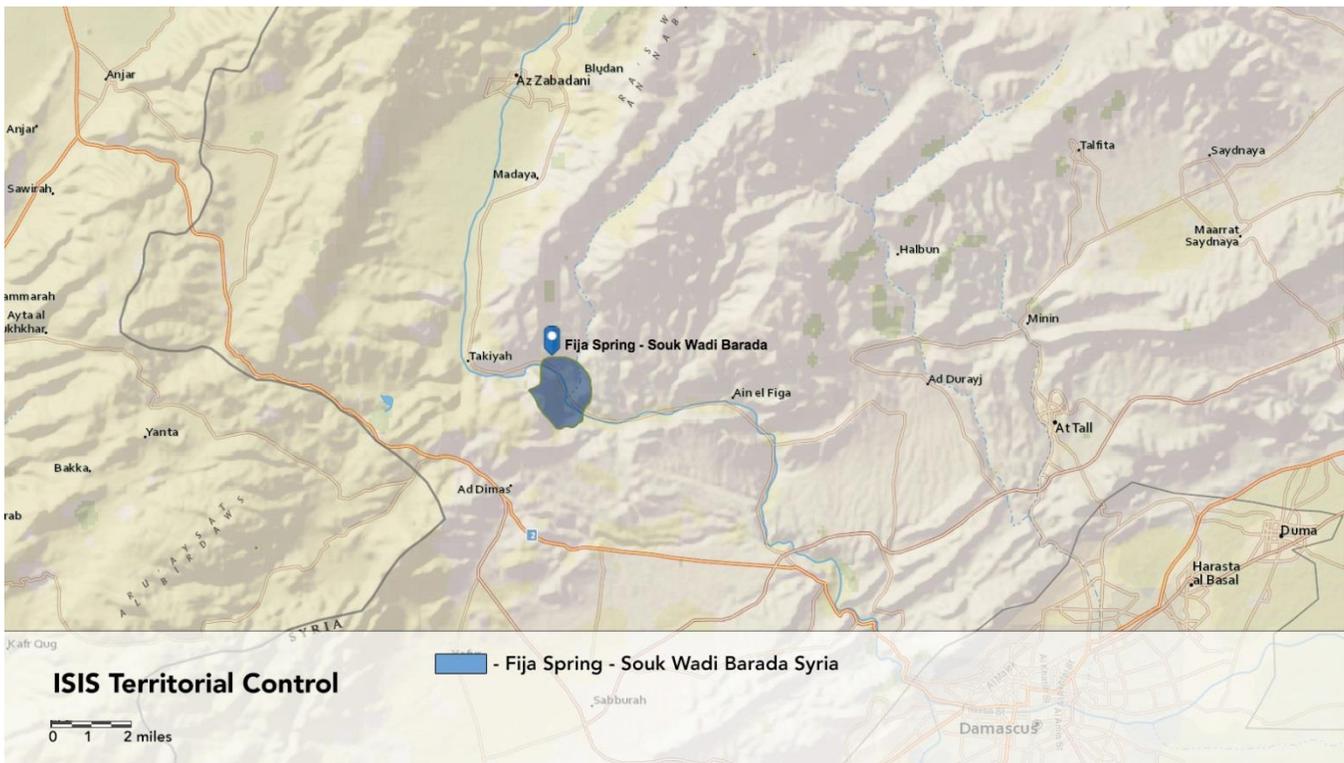


The Fija Spring Scenario. The Fija Spring is located in the Wadi Barada river valley near the southwestern most region of Syria, near the border of Lebanon and Syria. The spring flows from the Qalamoun Mountains through to the Barada River. The area is a strategic supply route and the main water source for the region, including supplying two thirds of the water

supply to the capital of Syria, Damascus. The Fija spring has been a source of conflict when the Free Syrian Army took control of the river basin and blocked the water flow to the capital (Raba'a, 2015). In 2014 the self-proclaimed Islamic State vocalized interest in the area, and with recent defeats, I believe that the organization will be looking for new water locations.

Additionally, the capital city of Damascus is in contentious fighting between groups in Syria and the self-proclaimed Islamic State; control of the Fija spring would help the group conquer the capital (Raba'a, 2015).

Figure 4. Fija Spring Scenario



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