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Water and War: The Potential for Perpetuation of Conflict Due To Climate Change

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Abstract:

Climate change has had a dramatic impact on the world's weather for years, scientists can only make predictions about how global climate will continue to change going forward; but in all scenarios the circumstances are quite dire. The Middle East and North Africa (MENA) will see some of the most severe effects of climate change, which will permanently alter the lives of millions of people in the region. In the MENA region, climate change is projected to result in extreme drought and temperatures which will lead to increased water scarcity, in what is already the most water poor region in the world. This decrease in water will lead to increased competition for resources, human migration, and conflict over water access. The MENA region has a long history of using water as a weapon in war, as well as a driving factor behind starting it. The researcher comes to this conclusion after research in the form of five interviews, as well as an extensive literature review. The research not only hopes to find an answer to the question of whether conflict is seemingly imminent, but to also show the ways in which international negotiation and support is needed in order to mitigate the effects of climate change.

Keywords: Climate, Regional Studies: Middle East, Peace & Social Justice

Introduction:

Climate change is an increasingly more important issue globally. The researcher has been interested in climate change for years, and has previously conducted research on the environmental impacts of the global food production system. Interest in the connection between climate change and conflict began during a lecture in the Psychology of Peace class. One of the lecturers was discussing the peace process and different ways peace may be attainable in the region. The researcher asked the lecturer if he thought climate change could prevent lasting peace. The lecturer was unable to answer the question, and said that climate change was not discussed in the region. This prompted the researcher to become more intent on finding an answer to this question. In the search for more information, the researcher came to the realization that this was an issue that should be looked into more closely, and thus decided to make their ISP research topic about climate change and conflict, in order to find an answer to their question.

Over the past one hundred years there has been a noticeable change in the world's climate. There has been increasing focus on the effects of climate change, and they way it is impacting global weather patterns. Climate scientists predict that we are rapidly approaching a tipping point, which will result in permanent changes to the global climate. The Middle East has seen severe droughts over the past 21 years.[1] The drought from 1998 to 2012 was fifty percent drier than the driest period in the last 500 years.[2] In the Levant, the majority of the impact of climate change has been decreased rainfall, leading to drought, and conflict over water.[3] The burden of climate change will be carried by developing countries, and those with fewer resources to offer. Climate change is important in Jordan because of its lack of water resources. As one of

[1]Hille, 2016
[2]Hille, 2016
[3]Broom, 2019

the most rain-poor countries in the world, water is an exceptionally valuable resource. Jordan does not have any water to spare, and is being stuck by a prolonged drought, which is reducing their finite resources more quickly. A reduction in resources, will lead to greater competition for the small amount of resources available. Jordan already has a fair amount of internal competition for water holdings, with millions of refugees and Jordanians attempting to share a limited amount of water resources. Water will continue to deplenish, and there is the potential for Jordan's population to continue to rise dramatically due to the threat of uprising and conflict in surrounding nations, and the potential for there to be millions more refugees seeking aid in Jordan. The Jordanian government does not have the resources to support their own people and those who have come to Jordan for refuge. There is strong potential for uprising in the future, which could destabilize what has been one of the most resistant and stable governments in the Middle East.

This study focuses on the countries of the Middle East and North Africa, as shown below in Figure 1. While the definition of the MENA (Middle East and North Africa) region is fluid, this study will focus on the nations pictured below. This study aims to look at the MENA region as a whole, with additional focus on a few of the countries in MENA.

Figure 1: Map of the Middle East & North Africa[4]

This research is to find out if climate change will lead to a decrease in rainfall in the Middle East and North Africa which will result in an increase in conflict at the state and individual levels. The expected outcomes of this research, is the potential effects of climate change in the region, and the expected results of that conflict. This research is based on the research and theory that climate change will result in a change in global weather patterns, leading to sea level rise, increased temperatures in MENA, and a decrease in rainfall in the region. Climate change is not only a threat to water availability, but also energy in the Middle East and North Africa.[5] This research also relies on the theory that a reduction of resources leads to competition and conflict over and about the limited resources.

[4] Abdu, 2018
[5] Beyond Scarcity, 2017

Literature Review:

Climate change is affecting the entire planet in various ways. In the Middle East and North Africa, the results of climate change have been seen for years. Climate change will cause temperatures to rise, and extreme heat to be felt throughout the MENA region.[6] The region will be warmer for longer periods of time, which will result in some areas to be uninhabitable for humans, and a reduction in land area that can be used for agriculture.[7] The areas affected by the increased temperatures will not be limited to agricultural lands however, it is likely that the majority of the most densely populated areas and capital cities will feel these extreme temperatures for at least four months out of the year, every year.[8] The reduction of crops due to decreased water resources will likely lead to migration, and increase the risk of conflict.[9] The MENA is the most water stressed region in the world, and the rapid urbanization and population increase only adds additional stress on water resources, which are already scarce.[10] Figure 2 shows the average yearly rainfall in some Middle Eastern countries. The global average for rainfall is 990 mm per year, over the entire earth's surface.[11] Even the most water rich countries in the MENA region have average precipitation that is far lower than the global average. The MENA region is comprised of the majority of the most rain poor countries in the world.

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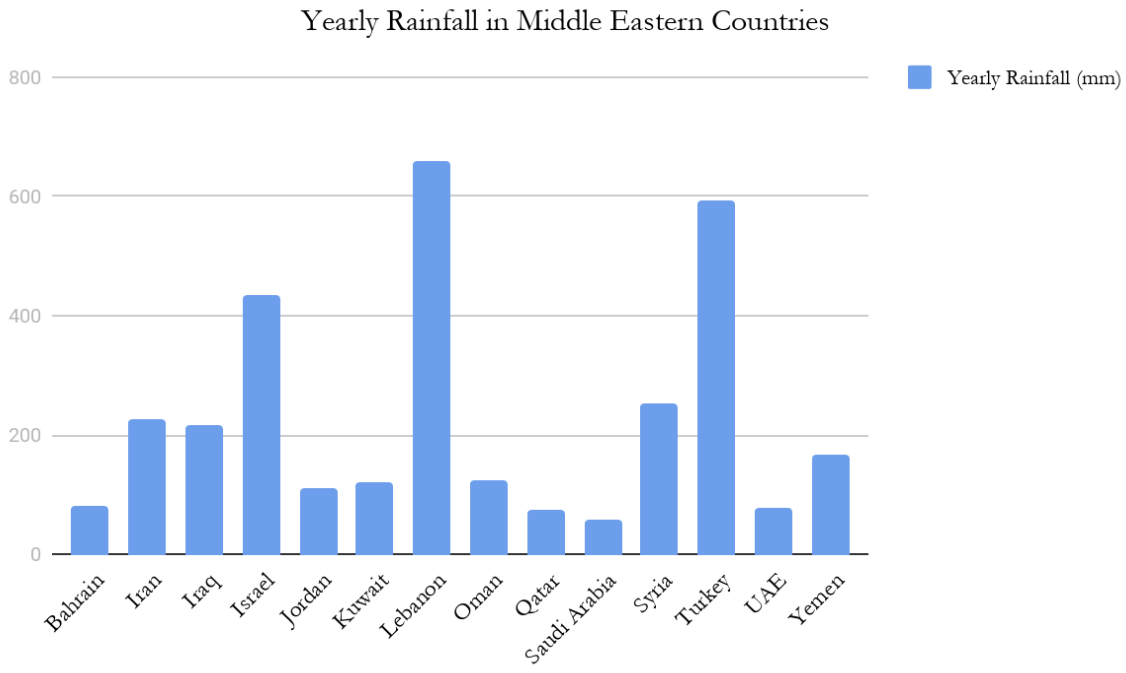
[6] Climate Change in the Middle East & North Africa, 2019
[7] Climate Change in the Middle East & North Africa, 2019
[8] Climate Change in the Middle East & North Africa, 2019
[9] Climate Change in the Middle East & North Africa, 2019
[10] Average Precipitation
[11] Average Precipitation

Figure 2: [12]



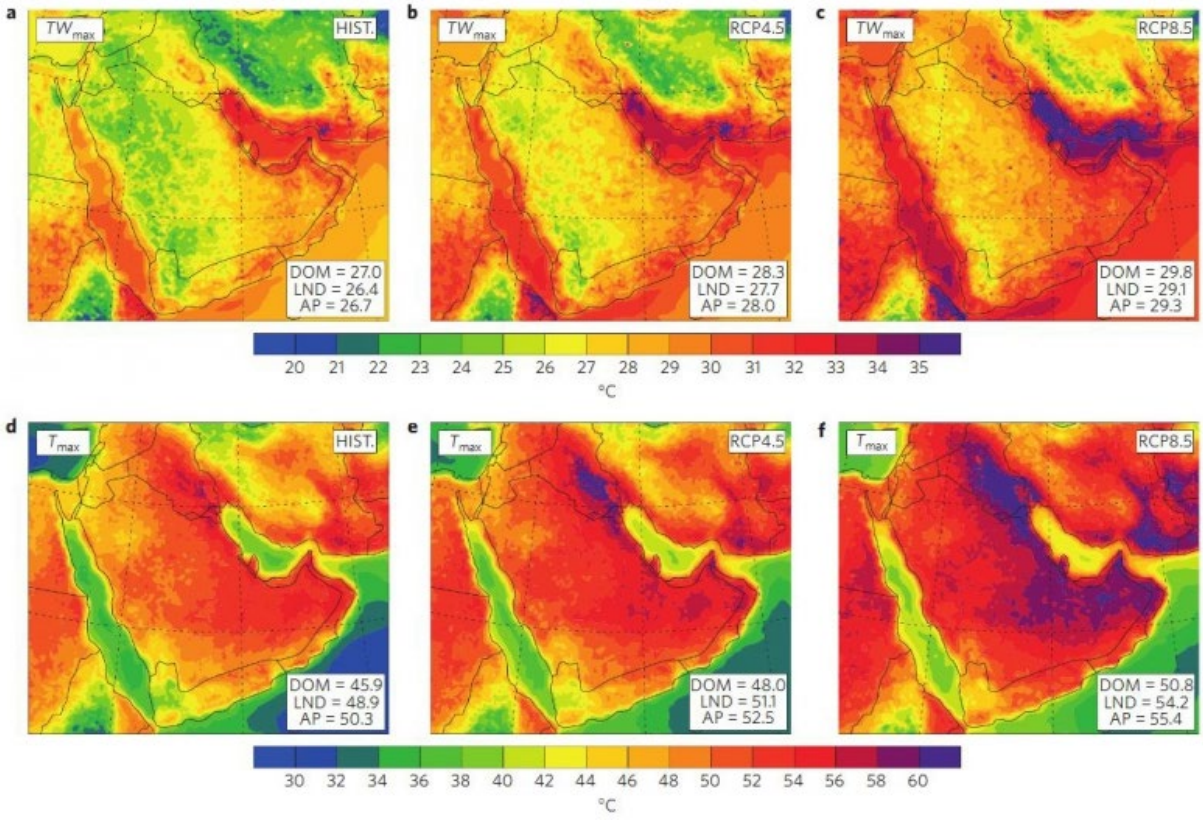
Lack of rainfall is already a large problem in the Middle East and North Africa, yet it has the potential to become even more scarce in the near future.

Climate change is a result of greenhouse gases, such as carbon dioxide, methane, and nitrous oxide being in the earth's atmosphere in large amounts. These gases have been produced at extreme quantities due to human presence on Earth, and industrialization and production over the last century and a half. The presence of these gases in our atmosphere causes heat to remain in Earth's atmosphere which has caused a global increase in temperature. This temperature increase not only makes the planet hotter, but also changes global weather patterns. As the planet continues to warm, global weather patterns will continue to shift and become more extreme. Over the past one hundred years, the world's temperature has increased by 1.9 °C.[13] The

[12] Average Precipitation
[13] Thomson, Leveille, Porzucki, & Hackel, 2015

temperature rise appears to be exponential, meaning that it will increase at an ever quickening rate. Many climate change projections look at the potential effects of climate change with various increases in global temperature. While the effects will happen either way, the degree to which the planet continues to warm will affect the severity of some of the results. In the MENA, the difference between a warming of 2°C and 4°C makes a large difference. The figure below shows the current temperature in MENA, the temperatures if there was a global increase of 1.4°C, and the temperatures if there was a global increase of 2°C. Figure 3 shows not only the average temperature information, which is the bottom row, but also the temperature plus humidity projections.

Figure 3: [14]



[14] Thomson, Leveille, Porzucki, & Hackel, 2015

With a temperature increase, there will also be a decrease in yearly average rainfall. If the planet's temperature increases by 2°C, rainfall is projected to decline by 20 to 40% in the MENA region, if the temperature increases by 4°C, rainfall could decrease by 60%.[15] This will severely altar thar region's ability to provide water and other resources to its people.

Some doubt the accuracy of climate change predictions, however these temperature increases have already been seen in the MENA region. Recently, temperature records have been repeatedly broken due to the higher and higher temperatures seen in the region; the highest recorded temperature in the region was recorded in 2016 in Mitribah, Kuwait, which recorded at 54°C.[16] In Basra, Iraq, temperatures have reached 53.9°C, and in Sweihan, United Arab Emirates, temperatures have reached a high of 50.4°C, causing the Emirati government to issue numerous warnings after vehicles began catching fire due to the extreme temperatures.[17] The MENA region has been in a near continuous drought since 1998.[18] According to some research, by 2050 temperatures in the MENA region will be 4°C higher than current temperatures, causing daily highs to be near 50°C, and there to be over 200 days per year with exceptional heat.[19] Some predictions expect major cities and large amounts of the region to be uninhabitable by 2100, and by 2025 the World Bank estimates that 80-100 million people will be exposed to water stress.[20] The MENA region will be one of the most affected places on earth due to climate change, and is seeing the effects differently.

> ""The Mediterranean is one of the areas that is unanimously projected [in climate models] as going to dry in the future [due to man-made climate change]," said Yochanan Kushnir, a climate scientist at Lamont Doherty Earth Observatory, who

[15] Beyond Scarcity, 2017
[16] Broom, 2019
[17] Broom, 2019
[18] NASA, 2019
[19] Broom, 2019
[20] Broom, 2019

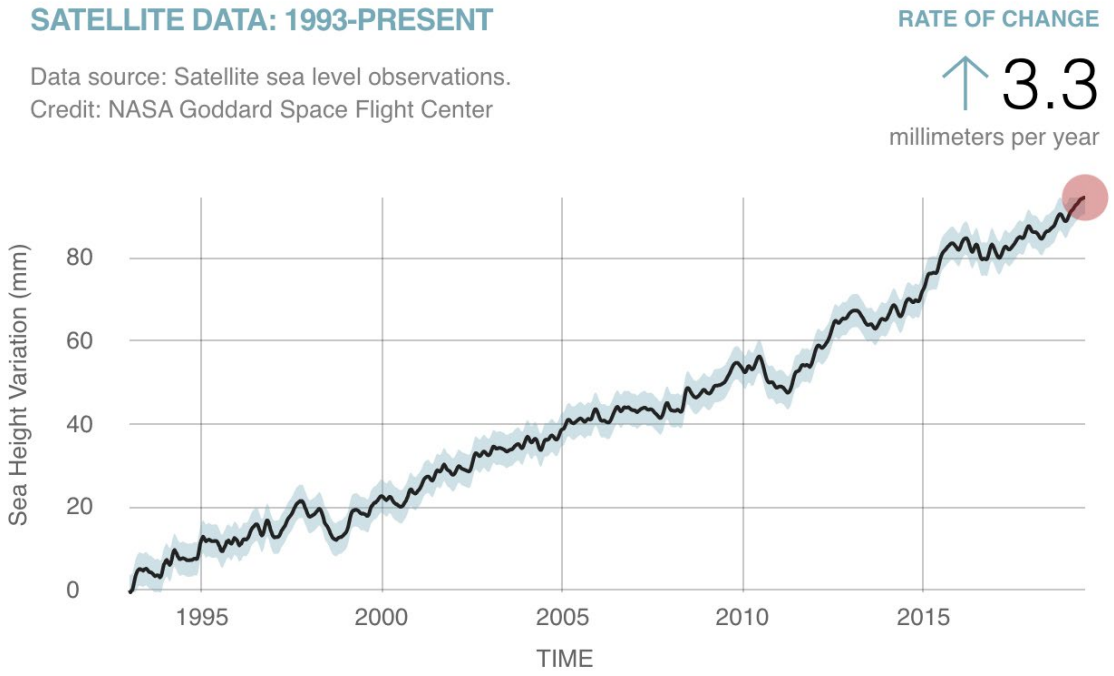
> was not involved in the research. "This paper shows that the behavior during this recent drought period is different than what we see in the rest of the record," he said, which means that the Levant region may already be feeling the affects of human-induced warming of the planet."[21]

The increased risk in the MENA region is cause for greater concern and attention and aid to go towards the region in order to best mitigate the effects of climate change. Drought in the region is likely to cause large scale human migration, and to create the need for more imported goods, and aid.

Drought is not the only way water threatens the region however. With the droughts, there has also been an increase of flooding, because the soil cannot properly absorb the rainfall, and countries are not adequately prepared to use rain water runoff.[22] In Saudi Arabia the danger of flooding has been seen in cities like Jeddah which have had countless casualties due to storm water. Climate change has also led to the melting of icecaps and sea level rise. With many MENA countries sitting in part on the Meditteranean, there is heightened risk for flooding and coastal damage. Figure 4 shows recent sea level rise, which is expected to continue to increase at an ever quickening pace.[23]

Figure 4:[24]

[21] Hill, 2016
[22] Broom, 2019
[23] NASA, 2019
[24] NASA, 2019



The World Bank has declared the MENA region as one of the most vulnerable places on Earth to rising sea levels, naming Egypt, Kuwait, Libya, Qatar, Tunisia, and the UAE to be at particular risk.[25] The World Bank has also forecasted a .5 meter sea level rise by 2100.[26] The Egyptian city of Alexandria has been noted to be at extremely high risk due to climate change;

> "As sea levels rise, the city of five million people is sinking. High waters are flooding basements of buildings near Alexandria's waterfront Corniche, leading to fatal collapses. Three people died in January when a block of apartments collapsed one street back from the seafront. [...] The Nile Delta, on which Alexandria stands, is shrinking. Construction of the Aswan High Dam and the extraction of water upstream has reduced the Nile's flow, decreasing the amount of silt the river deposits. And without silt to replenish delta soils, the whole area is vanishing."[27]

Other cities are also at great risk due to sea level rise, and the alteration of rivers and water movements due to the construction of dams, and the removal of water from rivers.

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[25] Adaptation, 2016
[26] Adaptation, 2016
[27] Broom, 2019

Climate change has the potential to cause mass destruction in the MENA region, however there is strong potential that human intervention and action will cause more harm and destruction than climate change. The MENA region has seen near perpetual conflict for the past century, with wide variation behind the cause of strife. Water has been a defining factor in numerous cases however, and has both led to conflict and been used strategically to gain an upper hand. In the Syrian uprising which began in 2011, there is a multitude of factors that triggered wide scale revolt.[28] These causes include, "a broad set of religious and sociopolitical factors, the erosion of the economic health of the country, a wave of political reform sweeping over the Middle East and North Africa (MENA) and Levant region, and challenges associated with climate variability and change and the availability and use of freshwater."[29] Water and climate, namely the deterioration of water resources, and the lack of effective water distribution were strongly contributed to the civil war. The inability for farmers to make a living and continue to reside in rural areas, caused added stress, which in turn caused many to move to urban areas, increasing competition for resources, and thus increased the number of people who lacked access to resources, such as water, which are needed to sustain life.[30]

> "Severe multiyear drought beginning in the mid-2000s, combined with inefficient and often unmodernized irrigation systems and water abstractions by other parties in the eastern Mediterranean, including especially Syria, contributed to the displacement of large populations from rural to urban centers, food insecurity for more than a million people, and increased unemployment—with subsequent effects on political stability. [...] Absent any efforts to address population growth rates, these water-related factors are likely to produce even greater risks of local and regional political instability, unless other mechanisms for reducing water insecurity can be identified and implemented." [31]

[28] De Chatel, 2014
[29] Gleick, 2014
[30] Gleick, 2014
[31] Gleick, 2014

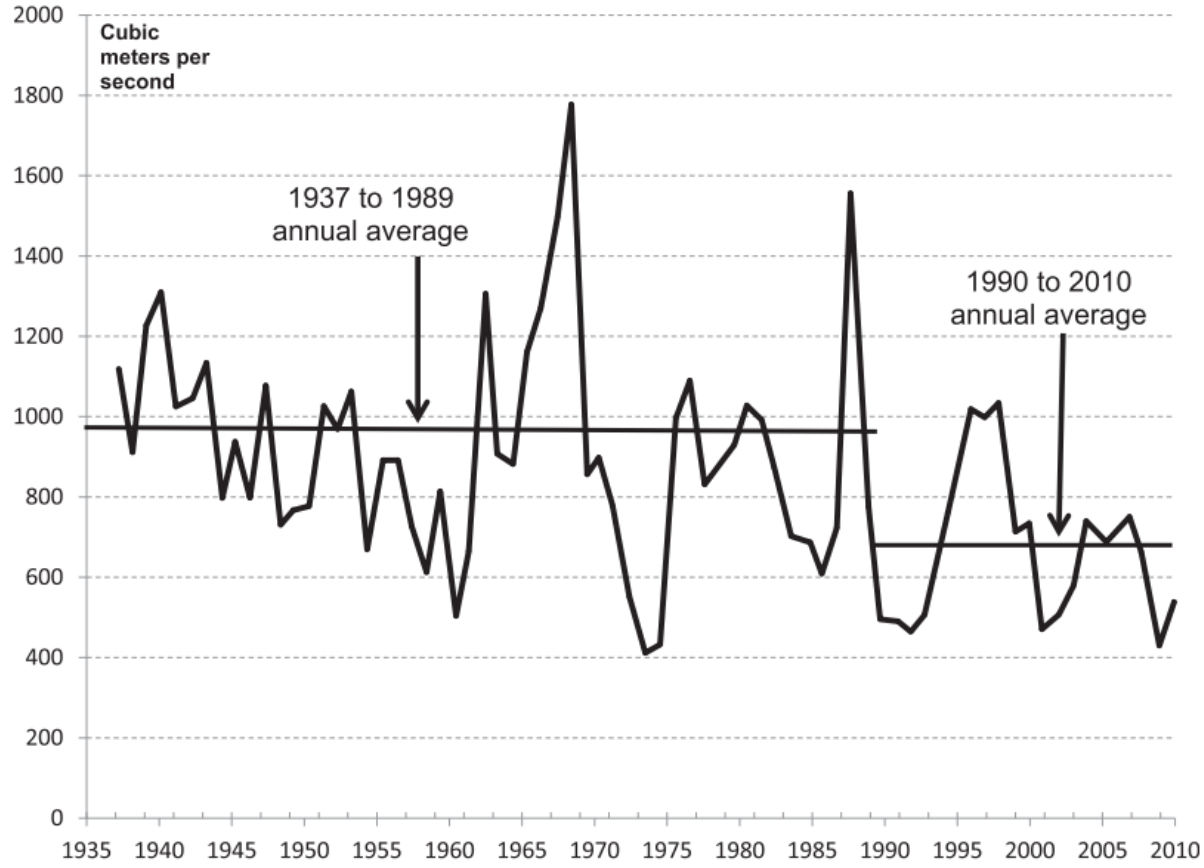
In Syria, as with any conflict, a multitude of factors caused the strife, however many of these factors can be traced back to the lack of water due to climate change. Water is important in all factors of life, and without access to water there is increased stress at the individual and state level.

The MENA region has a long history of water conflict. The first noted conflict over water in the region, was over 4,500 years ago between kings of Mesopotamia when the king of Umma destroyed irrigation canals dug along the Euphrates by the neighboring king of Girsu.[32] In the 4,500 years since, there have been countless conflicts around the Arab world over water. The destruction of aqueducts and irrigation systems, water diversion, the building of dams, intentional floods, and many other methods have been used in war to manipulate water in order to prevail over one's enemy.[33] While warfare has evolved dramatically over time, water continues to play a major role in conflicts and international relations in the region, and many states come head to head with one another for control over water resources. Jordan and Syria have had longstanding tensions over Syria's control of the Yarmouk River, since they constructed a series of dams in the 1990s.[34] Syria has also had a drawn out dispute with Turkey over the water distribution of the Euphrates River.[35] In 1990, the Ataturk Dam, which is controlled by Turkey, was completed and since the water flow in the Euphrates River in Syria has decreased dramatically.[36] Figure 5 shows the average flow of water in the Euphrates River from 1937 to 2010, the data was collected in Jarabulus, Syria, which is downstream of the border

[32] Jacobsen, 1969
[33] Jacobsen, 1969
[34] Gleick, 2014
[35] Gleick, 2014
[36] Gleick, 2014

between Syria and Turkey.[37] The graph shows how water flow decreased dramatically after the completion of the dam, which increased water scarcity in Syria.

Figure 5:[38]



The conflict over the water from the Euphrates River does not end with Syria however, the river continues to flow into Iraq, which has also been affected by the decrease in water flow due to dams built not only in Turkey, but also in Syria. All three countries want to use the river's water in order to irrigate land, produce electricity, and provide water to their people.[39] The Euphrates is not the only important river in the region however, the Tigris also flows through Turkey, Syria,

[37] UN-ESCWA, 2013
[38] UN-ESCWA, 2013
[39] Bulloch, 1993

and Iraq. Iraq is the last country that both rivers flow through before reaching the Arabian Gulf, and uses the water for power, as well as the main water supply for Baghdad and its other major cities.[40] The construction of dams in 1975 in Syria nearly brought Syria and Iraq to war.[41] Contention has also erupted over Turkey's Anatolia project. The Anatolia region of Turkey directly borders Syria, and the project has been an attempt to modernize the region, and increase the standard of living within South-East Turkey.[42] This project has increased farmland, mostly through the wide scale irrigation of land using water from the Euphrates River.[43] The conflict over water usage in the Anatolia region is multifaceted in that Turkey has little regard for the needs of Syria and Iraq, but not only are these parties involved, but Southern Turkey and Northern Syria is largely inhabited by Kurdish nationalists which adds another layer of strife and conflict into the region, and water division.[44] Today, the diplomacy of this area is more muddled due to the Turkish invasion of Northern Syria, and the state of Syria.

Syria and Iraq were also subject to the Islamic State of Iraq and the Levant (ISIL), which held large amounts of territory from around 2014 to 2017. At its peak in 2014, ISIL controlled around 39,000 square miles of territory in Iraq and Syria.[45] In 2013, the Islamic State captured Tabqa Dam in Syria, beginning a campaign for hydrological control.[46] Tabqa Dam is the world's largest earthen dam, and is the main power and water supply for millions of Syrians, including being a major energy and water source for the city of Aleppo, as well as being a large source of

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[40] Bulloch, 1993
[41] Bulloch, 1993
[42] Bulloch, 1993
[43] Bulloch, 1993
[44] Bulloch, 1993
[45] Jones, Dobbins, Byman, Chivvis, Connable, Martini, Robinson, & Chandler, 2017
[46] Pearce, 2014

water for irrigation for over a thousand square kilometers of farmland.[47] Control of the dam by ISIL posed great risks;

> "The Islamic State's control of the Tabqa Dam has been haphazard, to say the least. In May [2014], the reservoir behind it, Lake Assad, dramatically emptied. Many blamed Turkey for holding Euphrates water back behind its own dams upstream. But the Arab news service Al Jazeera quoted engineers at the dam as saying that their new masters had ordered them to maximize the supply of electricity. That required emptying the reservoir's water through the dam's hydroelectric turbines. Since late May, the Islamic State has been trying to refill the reservoir by rationing electricity from the dam, with blackouts in Aleppo for 16 to 20 hours a day. Meanwhile, other fighting groups have shut down a water pumping station, cutting off clean water supplies for a million people in Aleppo." [48]

The seizure of the dam by ISIL resulted in dramatic shifts for millions of people in Syria, and for a reduction of resources and access to water and other basic utilities. The Tabqa dam is not an isolated danger, there are multiple other dams, just in Iraq, which pose a great risk to the population, both as a tool for war, and as a structural danger. Further downstream, in the center of the country, near Baghdad, the Fallujah dam is used to divert water for irrigation of the farms that feed most of the country.[49] In April of 2014, the Fallujah dam was seized by ISIL, which immediately shut down the dam, preventing any water from flowing downstream, which seriously altered food production.[50] Perhaps the greatest risk in Iraq is the Mosul Dam. It has been labeled by the US Army Corps of Engineers, the most dangerous dam in the world.[51] The dam is built on top of gypsum, which is creating large sinkholes underneath the dam, which threaten the structural integrity of the dam severely.[52] The dam is at constant risk of collapse, which would result in its 11 cubic kilometers of water flooding Mosul with a flood wave peaking

[47] Pearce, 2014
[48] Pearce, 2014
[49] Pearce, 2014
[50] Pearce, 2014
[51] Pearce, 2014
[52] Pearce, 2014

at 20 meters high within three hours, and within 72 hours, a four meter high wave would hit Baghdad.[53] The series of dams continue to pose an extreme risk to millions of people. Not only can they be used to cut off the water and power supply, but also as a means of war. During the American invasion of Iraq in 2003, US troops targeted dams first to capture, due to their fear that Saddam Hussein would release a catastrophic flood.[54] Luckily, catastrophe was avoided, and the dams remain functional today, however in the future they could be used to unleash great harm, or used to prevent nations in need from receiving water. Without strong government oversight, there is potential for structures such as the dams in Iraq to be a targets and threats throughout the MENA region, due to the great impact they have on ecosystems, and on the people who rely on them for water.

Iraq is not the only country reliant on dammed rivers for a large portion of its water supply. Egypt obtains the majority of its water from the Nile River, which receives its water from Sudan and Ethiopia.[55] Like many states, Egypt is wary of development upstream because it limits the resources available downstream. Like Iraq, Iran, Jordan, and Syria, Egypt is dependent on the whims of upstream states to not build dams and obstruct waterflow to them. This dependency leads to heightened tensions, and strain on foreign relations, when upstream powers divert and use water resources.

There has also been conflict over the Jordan River and its surrounding aquifers, with Jordan, Lebanon, Syria, Israel, and Palestine all competing for water resources.[56] Lebanon and Syria are both upstream, and thus have the first access to the water that flows in the Jordan River,

[53] Pearce, 2014
[54] Pearce, 2014
[55] Pearce, 2014
[56] Bulloch, 1993

leaving Jordan, Israel, and Palestine at a disadvantage being downstream. The conflict over the Jordan River has lasted decades, and has been a contributing factor in the broader Arab-Israeli conflict, and has yet to reach a true resolution.

> Israel's neighbors face a similar situation. Their survival is no less at stake—which makes the line between war and peace here very fine indeed. In the 1960s Israeli air strikes after Syria attempted to divert the Baniyas River (one of the Jordan's headwaters in the Golan Heights), together with Arab attacks on Israel's National Water Carrier project, lit fuses for the Six Day War. Israel and Jordan nearly came to blows over a sandbar in the Yarmuk River in 1979. And in 2002 Israel threatened to shell agricultural pumping stations on the Hasbani, another of the headwaters in southern Lebanon.[57]

The strife between Jordan, Israel, and Palestine over water is not limited to just the Jordan River, the Dead Sea is also a valuable water resource due to the ability to desalinate its water for use. The Dead Sea has shrunk by nearly a third in the past twenty years, with water dropping by over a meter per year. This is due to lack of rainfall, higher temperatures, increased evaporation, and decreased water input from the Jordan River due to siphoning of water flow.[58] The Jordanian and Israeli governments have agreed to fund a pipeline bringing water from the Red Sea to the Dead Sea, in attempts to bring water supplies closer to urban populations, and refill the lake.[59] Deals such as this show progress towards negotiation, however it can also be a point of increased tensions, especially due to the failings of some participants.

Water has been a source for nations to consistently butt heads over control and availability. Climate change will decrease the amount of available water in the MENA region, and countries are already using up ground water at a much faster rate than it can be replenished. The history of conflict in the regions shows that it is a divisive issue in the region, and one

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[57] Belt & Pellegrin, 2017
[58] Pearce, 2014
[59] Pearce, 2014

nations will go to war over. Water scarcity not only threatens the state externally, but also opens the doors to internal conflict and potential uprisings due to mismanagement. Climate change poses a serious threat to the state in all MENA countries due to the immense impact it will have on the way of life for millions of people.

Methodology:

The research experience was quite pleasant and successful. The interviews went well, and the responses to questions were thorough and on topic. I found the research difficult at times due to the breadth of information there is about the topic, and trying to keep interviewees answers within the scope of this research proved to be difficult at times. That being said, it was a good experience, and I found that my hypothesis was supported by the evidence provided in the interviews. I set out to interview five experts in the field, people who would know lots about climate change and conflict and would be able to give reliable information and opinions on the research topic. I found my interviewees in two ways, through my advisor, and through personal connections. As an academic, my advisor was able to put me into contact with her associates who are versed in the field, and whose expertise would align with my topic. I also found my interviewees through mutual connections, and people that I knew who were working in the field.

The interviews were all conducted in places of choice for the interviewees. The researcher wanted them to be comfortable in the environments they were choosing to speak to me in. This resulted in one interview being conducted in a cafe, and the other four taking place in the offices of the other individuals the researcher interviewed. All interviews were conducted in Amman, with all the offices of organizations and ministries in the city. Some of the organizations have operations and networks that reach throughout the MENA region, and in

some cases the world. All interviews were conducted in person, in Amman. At some of the offices, coworkers were in and out of the room, which the researcher thinks may have altered how candid some of the responses to questions were, however, overall the answers seemed very honest and forthcoming. In addition to the interviews, some organizations created data sheets and findings in relation to climate change and conflict and these were provided to the researcher. The ethical consideration behind this research is that climate change is seemingly inevitable, thus the consequences of climate change should be researched in order to best mitigate their effects, and it is the duty of those who are able to find such information work to aid those who would be affected by the potential results. The effects of climate change are felt most my impoverished communities, which are less likely to know about climate change, and its effects on their communities. The researcher also worked to ensure that all interviews were carried out in an ethical manner, and that the research itself would be ethically upstanding.

In order to get the best results, and to get the required data to test my hypothesis, the researcher spent lots of time writing my questions. She tried to write and order questions in a manner which would not result in prompting. The goal of this research was to find the most accurate information in regards to water, climate, and conflict in the MENA region, with that in mind, the researcher worked to ensure that my responses contained as little bias as possible, and were accurate, and truthful. In attempts to gather the best information, in addition to the research interviews, the researcher compiled an extensive literature review in order to give background into the issue of climate change and predictions for the climate going forward. In addition to information on the climate, the researcher also investigated the history of water in the region in relation to conflict, and past tensions in the MENA region due to water scarcity and insecurity.

The interviews were conducted and the data was collected in a manner in which the researcher tried to use the most sensitivity towards the subjects. Initial contact with the subjects made it clear that the research was for academic purposes, and included the purview of the research. This first contact was made either through whatsapp message, email, or phone call. To maintain the integrity of the information gathered, and of the research, all participants signed informed consent forms. The forms were designed to provide the subjects with all of their rights, so that they would know they could not answer any question they saw fit, or end the interview at any time. The form also gave interviewees the ability to opt to have their information remain anonymous to whatever extent they saw fit. This was to maintain the integrity of the research, and protect the research subjects.

The researcher did not encounter any major obstacles in the process of conducting her research project. Contacting and scheduling interviews with the research subjects proved to be a challenge due to cultural norms and their busy schedules. The researcher had multiple interviewees call at the last minute to reschedule, and others that she had scheduled interviews with, that simply never responded to follow up messages about dates & times of meetings. Despite these challenges, the researcher did successfully schedule and have five interviews. The researcher's position as a comparatively privileged student played a role in the project. Her background and previous knowledge of the research topic, and position as an American contributed to bias.

The researcher tried to remain aware of her potential bias and to combat it by attempting to remain objective. The positionality of the researcher may have also influenced the work. The researcher believed at the beginning of the project that climate change would lead to a decrease in water availability, thus resulting in an increase in conflict. This positionality resulted in

questions focusing around conflict, thus not truly researching other possibilities for the future of the Middle East. One of the interviewees asked if the researcher thought that peace and cooperation was a potential outcome of climate change in the region. Due to the researcher's knowledge of Middle Eastern affairs and history, she had only considered conflict as a likely outcome, and had not considered peace until prompted by the interviewee. The researcher tried to keep her own bias in mind, in order to provide the best, least biased results. The researcher has maintained the same topic throughout the research process, however she has evaluated the scope of said research in order to provide the best information on the topic. The scope remains relatively wide, in order to best discuss the potential causes and effects. Due to the interconnectedness of MENA countries, to accurately discuss the events of one, you must also evaluate the surrounding countries and powers.

Results:

The main objective of the interviews was to find out if specialists in the field supported the researcher's thesis. To work toward this objective, the researcher interviewed one worker at an NGO, two academics, and two employees of governmental institutes. The interviews focused on climate change in the MENA region, interviewees thoughts on the potential for conflict in the region, and their personal experience and knowledge of weather change, water scarcity, and conflict in the region.

All subjects agreed that they had seen a drastic change in the weather in Jordan throughout their lifetime. The notable changes they noted were the lack of rain, increase in flooding, and higher temperature. Two interviewees shared similar anecdotes about how when they were children, no one had air conditioning or knew what "AC" was, but today, it is rare to

go places without air conditioning, and it is a necessity due to the summer heat. All interviewees agreed that climate change had already had a strong effect on the weather in Jordan during their lifetime. Four of the five subjects mentioned how farmers were the first to be affected by the changes in climate, with the drought and need for more irrigation, impacting their livelihood. They noted how big of an impact water scarcity has on Jordan, and the greater MENA region. Two interviewees stated that "water is everything" and "water is everything, it is literally everything". Multiple subjects stated how Jordan is under immense water strain due to mismanagement of resources, and the high population due to refugees. Some interviewees stated that refugees were to blame for the water scarcity in Jordan, however data, and experience shows that this is simply not true, and that refugees tend to be the tagline chosen by government officials, to put the blame for the nation's problems elsewhere. When asked about refugees, another subject noted how they are most certainly not to blame for the water scarcity in Jordan, there have been water problems in Jordan long before the refugees were here; they do contribute, since population increases causes a need for more resources, however it is not a major driving force behind water scarcity in the country.

All subjects agreed that climate change will change the political landscape of the MENA region. There was some variation on this point however. Two interviewees stated how regional cooperation will be the key to maintaining peace in the region, and finding solutions to the imminent reduction in water resources. They did however refrain from stating the likelihood that international cooperation would be successful. The other three subjects noted, how obviously peace and negotiation would be the ideal outcome, however history shows that nations tend to go towards conflict instead of resolution. One interviewee remarked, "Water scarcity is a threat to national security". This was the prevailing sentiment from interviewees, that while the desired

outcome was not conflict, that is the most likely outcome of increased water scarcity in the region, due to other nation's greed. Subjects noted how Israel has, and will take a larger portion of water than Jordan, and exploit Jordan's water resources for their benefit, and that Saudi Arabia does the same, taking far more than their fair share from shared ground water resources. Countries are inherently safety optimizers, and having more water resources, is in their best interest, however it costs other nations, and according to the research subjects, is likely to be a point of contention going forward.

Remarks were also made about how urgent the issue of climate change is, and how the governments of the MENA region needed to quickly take action. One interviewee stated, "Water cannot wait, an environment knows no border." Others echoed this idea, and pointed out how governments in the region need to put far more effort into negotiations, and better water regulation and management. Overall, interviewees were uncertain if water scarcity would lead to uprising within a state, but they believed that it would lead to conflict at the state level. As has happened in the past, they believe water will be used as a tool in conflicts going forward, and they pointed out how water was used in transboundary disputes such as with Syria and Jordan, as well as between Egypt, Sudan, and Ethiopia over the Nile. One interviewee also brought up the Syrian civil war's root in climate change and how it should be a warning going forward. The others, when asked about the Syrian civil war were unaware of the connection, and many noted how impossible it is to root any conflict to one cause. Two subjects very strongly believed that water played an extremely small role in any conflicts that have happened in the past, and chose to instead blame politics, zionists, and regional tensions for all past conflicts. Historical facts, prove this to simply be wrong, and these interviewees showed clear bias in this line of questioning. The other interviewees maintained that there was a strong tie between conflict and

water in the region. They were certain, that water scarcity would lead to new tensions, at every level, from individuals to states.

Given the subject's identities as Jordanians, their answers focused on the problems currently afflicting Jordan, and they were most knowledgeable about the events in Jordan. There was less focus on the greater MENA region in their interviews, however, their analysis did still pertain to the entire MENA region, which is likely to see similar effects of climate change. The researcher hopes that future studies will be able to have a larger sample with more regional dispersion and knowledge, in order to gather the best, most accurate data.

Conclusion:

The researcher's hypothesis, that climate change will lead to a decrease in rainfall, an increase in water scarcity, and serve as an impetus for conflict was supported by her findings. The interviewees noted how the future is unknown, however, the data and evidence points towards increased drought in the MENA region, and history has shown that water is a resource that has been repeatedly fought over. All scientific signs point toward a dramatic shift in climate, and an increase in water scarcity in the Middle East and North Africa. This was unanimously agreed upon by the interviewees, and they each noted how they had seen the effects of climate change in their own lives. All subjects agreed that climate change will alter the political landscape of the MENA region. While we all hope that it will be an opportunity for unity, conflict is the most likely outcome. The subjects of the research agree that climate change will be an impetus for conflict, and without immediate action, there is a great likelihood for wide scale

suffering. As laid out by the study above, the MENA region has a long history of water related conflict, and there is a great likelihood that history will repeat itself, and there will be countless conflicts in the region due to increased water scarcity.

Study Limitations:

This study has been conducted using qualitative data through interviews on climate change and the environment. This study has had an exceptionally small sample size, and group which has been interviewed. While those interviewed were experts in the fields of climate change, the environment, and/or conflict, there were not enough interviewees to have a representative sample. The sample consists of all Jordanian nationals, which may lead to bias towards their opinion of the current situation in Jordan and in the Middle East and North Africa. The interviewees were also found through the personal connections of the researcher's advisor, and the researcher, which could result in them having more similar beliefs and opinions than others due to tendancies for people to associate with those who share similar beliefs. The sample of interviewees also consisted of three women and two men, and gender could could create bias in the research. Due to the research's focus on the Middle East and North Africa, it is a shortcoming in the research, that interviewees did not represent multiple nationalities. The sample group would be more representative if it included interviewees from more of the countries relevant to the research.

The goal of this study, in some aspects is also to be predictive of the potential dangers and risks which seem to be imminent. As with any prediction, there is a multitude of factors which could affect the outcomes in infinite ways. The Middle East and North Africa is a region which has been in perpetual conflict for over a century. There is a long history of conflict in the

region, creating countless reasons for strife between people and nations. This history provides nations with countless reasons they could go to war with one another, making it nearly impossible to know if climate change could be the driving force behind such conflict. While predictions are of aid, and are often correct, a limitation of the study is its inability to know all of the details, and the full scope of factors which affect Middle Eastern politics and relations.

Perhaps the biggest limitation to the study, is the lack of singular causes behind conflicts. As my interviewees noted, there is always war in the MENA region, and while water resources may be a large part in why they went to war, they don't directly say that water and climate change is why they went to war. While all the signs could point towards climate change being the cause of conflict, proving this is nearly impossible. Correlation does not mean causation, and this causes the study to only be able to be so accurate. While the research does have its own merit, it also has its fair share of limitations.

Recommendations for Further Studies:

In the future, studies should gather a larger more representative sample size in order to have data which is more likely to be significant. The issue of climate change needs to be studied more, and is so multi faceted, that there could be countless studies pertaining to climate change in the MENA region, each with individual merit. In relation to this study, the researcher focused on a large region with innumerable conflicts and external factors which can lead to conflicts in the region. Perhaps narrowing the scope of the research in order will allow researchers to have more detailed and accurate findings for future projects. As stated, the sample was also very small and is not enough participants to be seen as significant. Sample sizes should also be more representative and diverse in order to try and reduce bias. Future studies, should attempt to

interview multiple experts from each country pertinent to the study, in order to gather the widest range of information, and the most reliable data. Future studies could also narrow their scope and attempt to focus on perhaps only one country, however due to the interconnectedness of most MENA states, it is nearly impossible to talk about one without being in conversation with others. Future research may want to try to not focus on the predictive nature of events, and instead focus on current events, and tracing current conflicts and issues back to water and climate change. The nature of correlation and causation makes research on conflict very difficult, and without interviewing those who make the decisions to actually begin a conflict, causation is nearly impossible to prove. That being said, further research could do more to investigate and look into past and future conflicts more thoroughly.

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Interviews:

Eshak. In conversation with the author. November 2019.

Majd. In conversation with the author. November 2019.

Majd. In conversation with the author. November 2019.

Raed. In conversation with the author. November 2019.

Ruba. In conversation with the author. November 2019.

Appendices:

Appendix A: Informed Consent Form

Informed Consent Form

SIT Study Abroad
a program of World Learning

Title: Water and War: The Potential for Perpetuation of Conflict Due To Climate Change

Your Name/Homeschool: Kaufman Butler, Occidental College
School for International Training—Jordan: Modernization and Social Change

1. The purpose of this study is to learn more about the connection between climate and conflict. The researcher aims to learn if climate change will lead to increased conflict in the region, and if it will prevent peace from becoming a reality.
2. **Rights Notice**
   If at any time, you feel that you are at risk or exposed to unreasonable harm, you may terminate and stop the interview. Please take some time to carefully read the statements provided below.
   a. ***Privacy*** - all information you present in this interview may be recorded and safeguarded. If you do not want the information recorded, you need to let the interviewer know.

   b. ***Anonymity*** - all names in this study will be kept anonymous unless the participant chooses otherwise.

   c. ***Confidentiality*** - all names will remain completely confidential and fully protected by the interviewer. By signing below, you give the interviewer full responsibility to uphold this contract and its contents.
3. **Instructions:**

Please read the following statements carefully and mark your preferences where indicated. Signing below indicates your agreement with all statements and your voluntary participation in the study. Signing below while failing to mark a preference where indicated will be interpreted as an affirmative preference. Please ask the researcher if you have any questions regarding this consent form.

I am aware that this interview is conducted by an independent undergraduate researcher with the goal of producing a descriptive case study on climate change and conflict.

I am aware that the information I provide is for research purposes only. I understand that my responses will be confidential and that my name will not be associated with any results of this study.

I am aware that I have the right to full anonymity upon request, and that upon request the researcher will omit all identifying information from both notes and drafts.

I am aware that I have the right to refuse to answer any question and to terminate my participation at any time, and that the researcher will answer any questions I have about the study.

I am aware of and take full responsibility for any risk, physical, psychological, legal, or social, associated with participation in this study.

I am aware that I will not receive monetary compensation for participation in this study, but a copy of the final study will be made available to me upon request.

I [do / do not] give the researcher permission to use my name and position in the final study.

I [do / do not] give the researcher permission to use my organizational affiliation in the final study.

I [do / do not] give the researcher permission to use data collected in this interview in a later study.

Date: _____

Participant's Signature: _____

Participant's Printed Name: _____

Researcher's Signature: _____

Thank you for participating!

Questions, comments, complaints, and requests for the final written study can be directed to:

Dr. Raed Altabini, SIT Jordan Academic Director

Email: raed.altabini@sit.edu

Appendix B: Sample Interview Questions

1. Describe your occupation

2. How have you seen a change in the weather in Jordan/the region throughout your life

3. Do you think that climate change has had a significant effect on the weather here

4. Have you seen resources, such as water, become more scarce over time

5. Do you think going forward there will be less water in the region?

6. Has competition for resources and a lack of water lead to human migration?

7. Historically, how have you seen water in the region be used in conflict? Ex: iraq dams, syria preventing water from going into the sea go Galilee

8. Do you think competition for water resources has been a driving factor behind conflicts in the region, if so which ones.

9. How do you think climate change will affect people at the individual and community level?

10. How do you think climate change will affect sates and their stability and legitimacy?

11. In your opinion, will there be an increase in conflict in the region due to climate change? If so do you think it will be at the individual or state level, or both?

12. There has been commentary on the Syrian uprising being due in part to climate change and a lack of water, do you think that is true?

13. Do you think that there will be conflict in the future due to climate change?

14. Do you think there will be a shift in the politics and power dynamic of the region due to water?

15. Do you think initiatives such as the read to dead treaty, which will bring water to the Dead Sea and be desalinated to provide Jordan, Israel, and Palestine with more water will be successful

16. What do you think the climate here will change socially and politically going forward?