

WATERING THE DESERT: AZRAQ, PUBLIC OPINION, AND ENVIRONMENTAL  
POSTMATERIALISM

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ABSTRACT  
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In this thesis, I analyze the physical, political, and societal transformations in Azraq, Jordan, caused by over-exploitation of the town's aquifer. I also connect the changes I and others have observed in Azraq to two main theories: postmaterialism and its counterarguments, and the tragedy of the commons. In short, postmaterialism argues that societies that have advanced so that citizens do not have to devote their time and money to survival will have larger rates of environmentalism; the tragedy of the commons details the negative consequences of environmental degradation on those living around a common resource. In conducting the study, I carried out twenty-five surveys in Azraq that asked locals about the effects of the water shortage on their daily lives, their opinions on the national government's water policy as it pertains to Azraq, and their opinions on the national government's water policy pertaining to Jordan as a whole. Additionally, I conducted interviews with three Azraq farmers who discussed the impacts of government pumping from the aquifer on the agricultural sector; the president of the Azraq Wetland Reserve; and a representative of the Ministry of Water and Irrigation. I found that the national government's over-exploitation of the aquifer throughout the last three decades has led to increased environmental awareness in Azraq, which presents a direct counterargument to the postmaterialist thesis. I also found that Azraq presents a new way of understanding the tragedy of the commons, as the aquifer was once a common resource but is now controlled by the state. My findings imply that more shared, sustainable systems of groundwater governance will be necessary in the future.

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## **I. Introduction**

The Hashemite Kingdom of Jordan is one of the poorest countries in the world in terms of water - though there are some discrepancies in different rankings, most sources rank Jordan within the top five most water-poor countries globally. The water shortage in Jordan is a result of many factors: an arid climate, few in-country groundwater sources, poor water management, and disadvantages in international water disputes. In the coming years, water levels in the country will continue to dwindle with the effects of climate change. Spreading desertification throughout the Kingdom only makes research on the water crisis more important. This article is thus a contribution to existing academic literature and thought regarding groundwater access in Jordan, as well as the effects of environmental degradation on environmentalism and political thought in local communities. Specifically, the paper focuses on Azraq, a small, rural town in northeastern Jordan that sits atop a large aquifer.

This thesis analyzes Azraq through two primary theories: the tragedy of the commons (as described by Elinor Ostrom in 1990) and the post-materialist thesis (coined by Ronald Inglehart in 1971). The tragedy of the commons describes the environmental degradation that accompanies extraction from a common resource; Azraq presents a unique case study for this theory, as it is a formerly common resource that has transferred to the control of the government. The post-materialist thesis states that as societies advance and have more of their material needs satisfied, citizens have more free time, thought, and energy to pursue other causes, such as environmentalism. Azraq presents a

counterargument to post-materialism as the Azraqi population is very environmentally aware, despite being relatively low-income, because it experiences environmental degradation on a daily basis. My thesis thus answers the question of whether the political, social, and physical changes in Azraq create new ways of understanding the tragedy of the commons and environmental post-materialism.

I chose my research question based on my personal experience living in Jordan, both in the summer of 2017 and in the spring of 2018. When I first visited Jordan, I experienced the water shortage first-hand, as my apartment roommates and I had to remain mindful of how much water we used in order to avoid running out. Each week our building received a certain amount of water, and if we used it all, we had to either purchase more water or wait until the next week to receive more. Having prior academic interests in climate change and the relationship between the environment and politics, I decided to pursue my interests in the Jordanian water shortage further when I returned in the spring semester of 2018 as a part of the School for International Training (SIT). While at SIT, I completed an academic paper on the effects of the water shortage on public opinion in Azraq, finding that the way people experience the water crisis in Azraq seems to make them more environmentally aware and more likely to support government policies to conserve water in Azraq and in Jordan as a whole.

This paper builds upon my work at SIT, using the same survey and interview data in a different way to apply my observations in Azraq to existing literature as well as broader political theory, particularly relating to access to common resources and the causes of environmentalism in rural, low-income areas that are often most impacted by environmental degradation. Thus, in some ways, this paper is a continuation of my

previous study in that it further explores the relationship between the water shortage and public opinion in Azraq, asking what ways this case applies to theoretical concepts.

This research is particularly important as environmental degradation continues to be a hotbed issue on the stage of international policymaking. As man-made climate change rapidly shows its effects, some world leaders seem committed to finding a way to reverse or at least subdue those effects, while others, notably Donald Trump, dismiss the issue altogether. The importance of understanding not only the scientific impacts of climate change and water shortages, but also the societal and political implications of these phenomena is vital as these effects will begin to take hold in the near future. Perhaps no part of the world will be more greatly affected than the Middle East and North Africa (MENA).

Keeping these broad issues in mind, a better understanding of the town of Azraq is very important in understanding this paper. Historically, Azraq has been known as a desert oasis, a massive lake in the middle of the desert that has played host to several species of unique wildlife, and a place where travelers could stop to rest and admire the scenery. As such, throughout most of history Azraq was somewhat of an agricultural hub, and during my time there I met several farmers whose ancestors had raised unique livestock there, such as cows and water buffalo. Additionally, Azraq once boasted a thriving ecotourism industry, particularly known as a spot for bird-watchers to watch different species of birds as they stopped in Azraq for water during migration (Al-Eisawi, 2005).

Beginning in the 1960's, Azraq, however, began to change. As the water shortage became a crisis, the Jordanian government was becoming desperate to find more

groundwater resources within its borders. The government began pumping water from the Azraq aquifer, and developed pipelines to transport water from Azraq to the capital city, Amman, and Zarqa in the early 1980's. Azraq basin supplies about 20 million cubic meters (mcm) of water per year to Amman. This, combined with private extraction and illegal extraction, causes the aquifer to be exploited yearly at about 250 percent of its sustainable yield (Ta'any, et al., 2014). These numbers are disputed, however – a Jordan Times article in 2017 stated that Azraq supplies Amman with about 17 mcm of potable water to Amman and 43 mcm for irrigation. Since the influx of refugees following the outbreak of the Syrian Civil War, 3.2 million liters of drinking water are extracted from Azraq basin to be delivered to the nearby Azraq refugee camp (“Water Closely Linked to World’s Refugee Crisis,” 2018). According to the Royal Society for the Conservation of Nature (RSCN), water levels in the aquifer started “to decrease significantly in 1981 and reach[ed] alarming rates in 1993”. (“Azraq Wetland Reserve”, p. 1) Water continues to be pumped from the aquifer to Amman to this day, and the water level in the aquifer has been restored to about 10 percent of its original capacity, though achieving much more than this is difficult (Al-Hreisha, personal interview, 2018).

Importantly, the Jordanian government is taking steps to reduce the amount of water pumped from the Azraq aquifer. In 2016, the government published its National Water Strategy for 2016-2025, changes water provision practices around the Red-Dead Project. This project will be implemented in 2021 and will establish a conveyance canal to transport water between the Red Sea and the Dead Sea, providing a total of 235 mcm to the country every year for the next ten years. Due to the changes in water supply from

the implementation of Red-Dead, Azraq will only be required to provide 15 mcm of water per year, which will go to the Zarqa governorate (National Water Strategy, 2016).

Outside of physical changes, my interest in Azraq primarily concerns political and societal consequences of water pumping on the local community. In this paper I relate my own observations to two main theories: Ronald Inglehart's postmaterialist thesis and Elinor Ostrom's tragedy of the commons. The postmaterialist thesis describes how as societies advance and become satisfied in the material sense, citizens will be able to devote more of their time to other causes, such as environmentalism. The tragedy of the commons discusses how those living around a common resource experience environmental degradation first hand as the resource is depleted, polluted or otherwise destroyed. In particular, I argue that Azraq provides a new way of understanding the tragedy of the commons, as Azraq has a resource that was once commonly accessed by the community but which has now come under the control of the state. With regards to post-materialism, I use Bryan Tilt's critique of the post-materialist thesis as the basis for my argument, and state that Azraq provides a counterexample to post-materialism. I argue that shared and sustainable systems of groundwater governance are necessary in order to use and preserve, not deplete, global sources of groundwater. More in-depth explanations of each theory, as well as my methodology and findings, are given in the following sections.

## II. Literature Review

### *a. The postmaterialist thesis*

My research builds largely upon counterarguments to the postmaterialist thesis, which was initially coined by Ronald Inglehart in his 1971 book *The Silent Revolution in Europe: Intergenerational Change in Post-industrial Societies*. In an overview for the *American Political Science Review* of the main theories and findings of the book, Inglehart wrote that before the modern era, people were “forced to give priority to survival needs,” as survival was not guaranteed. But, he argues, “... in advanced industrial societies, ... [the postwar generation] give[s] increasingly high priority to ‘Postmaterialist’ values such as belonging, self-expression, and free choice”. (Inglehart, 2006, p. 685). Essentially, the theory asserts that as societies become industrialized and wealthy, members of society do not have to devote most of their time to meeting survival needs. As a result, citizens are able to pursue postmaterialist causes, one of which is the environment. Thus, society as a whole becomes more environmentally aware and more supportive of environmental causes.

Booth (2017) later connected postmaterialism to environmentalism in a study in which he analyzed the relationship between different variables such as age and political affiliation with postmaterialist ideals, and then the relationship between postmaterialism values and environmentalist values. Essentially, Booth sought to find out if one’s age or political affiliation correlated with strong postmaterialist values, or the prioritization of

various abstract postmaterialist values as described by Inglehart over more tangible, material values. After understanding the relationship between these human variables and postmaterialism, Booth examined whether or not strong postmaterialist idealism correlated with strong environmental consciousness. The study found that “the postmaterialism index predicts an increase in the priority of the environment over growth, environmental group inactive and active membership, contributing to an ecological organization, and attending environmental demonstrations” (p. 1414). In other words, strong postmaterialists (which Booth finds are more likely to be young people and those who lean politically liberal) are more likely to be concerned with the environment and to play a more active role in the environmental cause.

The postmaterialist thesis is important as a theoretical contribution to the question of what makes people become more environmentally aware and active. The authors mentioned previously assert that post-materialist societies, or individuals with post-materialist values, will have greater concern for the environment and be more likely to participate in environmental political activism than their materialist counterparts. However, my research argues against this notion, as the case of Azraq counters the idea that post-materialists are more concerned about the environment than materialists are. My argument builds on research I conducted in Azraq in the spring of 2018; I found that in Azraq, people’s particular experiences of the water crisis caused them to develop negative opinions of government water policy in Jordan as a whole.

*b. Arguing against postmaterialism: Literature, Azraq, and “the tragedy of the commons”*

My argument draws heavily from counterarguments to the postmaterialist thesis, specifically writings from Bryan Tilt and Elinor Ostrom. Tilt, in *The Struggle for Sustainability in Rural China* (2009), describes research he conducted primarily in the Futian district of the Sichuan province, focusing on sustainability issues and policy in the country. A primary aspect of the research is the examination of sustainability culture within civil society in both rural and urban areas. Tilt argues against the postmaterialist thesis, which he defines as, “as societies undergo the transition to industrial development and modernity, their citizens begin to concern themselves with needs and wants beyond the material” (p. 6). As discussed previously, supporters of the postmaterialist thesis argue that this transition results in greater interest in concerns such as environmentalism.

Tilt, however, presents a counterargument to the postmaterialist thesis, citing a 1992 Gallup poll which found that “citizens of rich and poor countries alike were extremely concerned about the environment” (p. 6). Tilt goes on to discuss the way that two types of environmentalism may be forming - one in the “global North” and one in the “global South.” He terms the environmentalism of the global North “full-bellied environmentalism,” and describes this as a type of environmentalism that results because of affluence and the ability to care about causes beyond the material. Tilt contrasts this with “empty-bellied environmentalism,” the environmentalism of the global South that forms “as people experience directly environmental problems, such as pollution, that

continue to be acute in the developing world and are often the result of First World countries externalizing their own environmentally damaging behaviors.”

The Nobel Prize - winning political economist Elinor Ostrom has also published research that counters the postmaterialist thesis. In *Governing the Commons* (1990), Ostrom states that in environmental literature, the “tragedy of the commons’ has come to symbolize the environmental degradation to be expected whenever many individuals use a scarce resource in common” (p. 1). In other words, as citizens make use of a local environmental resource (the “commons”), environmental degradation will ensue due to the depletion of this natural resource (the “tragedy”). This environmental tragedy of the commons is particularly pertinent in the case of water use, as the depletion of natural water sources can cause severe environmental degradation, which in turn affects the people surrounding the water source. In Azraq, this scarce resource is the aquifer, used in common both by Azraq locals but also by Jordanian citizens in general, which has led to environmental degradation and, by extension, societal and physical changes in Azraq.

Ostrom’s exploration of the tragedy of the commons and its relationship with the environment further reinforces the ways in which the postmaterialist thesis fails to hold up in rural, poor areas. If the citizens living around a common natural resource are most affected by its depletion and the environmental degradation caused by the depletion of that resource, it follows that these citizens would be very aware of environmental impacts because they experience those impacts on a daily basis. Thus, Ostrom’s tragedy of the commons ties into Tilt’s refusal of the postmaterialist thesis as the tragedy of the commons explains why and how citizens around a common resource experience

environmental degradation, which Tilt argues makes those citizens more environmentally aware.

Brechin and Kempton (1994) argue that the postmaterialist thesis has become accepted because it fits a narrative of rich vs. poor nations, allowing both sides of this equation to use environmentalism to their advantage. Rich or developed nations, for example, are able to use postmaterialism to reinforce a stereotype of developing countries as “peasants” and to support industrial projects in developing countries without concern for their environmental effects. Conversely, leaders of developing nations are able to use “We can’t afford to worry about the environment” in order to acquire more international aid from developed nations. Because of this, Brechin and Kempton argue that the postmaterialist thesis as it relates to environmentalism “has such political utility that it would probably survive without theoretical support” (p. 246).

However, they argue, just because the idea that postmaterialist societies are more environmentally aware has significant political utility does not mean that this theory holds up under closer scrutiny. Similarly to Tilt, Brechin and Kempton assert that rates of environmentalism will be higher in developing countries than in developed ones. Environmentalism in developing countries, according to the authors, has five possible explanations: “(1) environmental justice and social protest, (2) mass media diffusion of environmental values, (3) direct observation of environmental change and degradation, (4) institutional processes, and (5) the possibility that ‘environmentalism’ itself has changed, and is now a more materialist value” (p. 261). I agree with Brechin and Kempton and argue that postmaterialism does not apply in all cases, and that “direct

observation of environmental change and degradation,” the authors’ third explanation for environmentalism, applies in Azraq.

This literature on the postmaterialist thesis and its counterarguments lays the foundation for my research on how the environmental, political, and societal situation in Azraq provides contrasting evidence to the postmaterialist thesis. In this paper, I argue that the postmaterialist thesis does not apply in Azraq, but rather that Azraq is an example of environmentalism at work in rural and under-developed areas. In future sections, I will describe both my methodology in gathering field data in Azraq, as well as existing literature on the economic and political situation in Azraq. Additionally, I will discuss my own findings in Azraq as well as the relationship between Azraq and postmaterialism.

### **III. Methodology**

As stated in the introduction, this study builds upon a previous research project I completed as a part of the School for International Training (SIT). I studied with SIT for a semester-long program in Amman, Jordan, entitled “SIT Jordan: Geopolitics, International Relations, and the Future of the Middle East,” during the spring semester of 2018. As a requirement of the program, each student completes a research project or internship during the final month of the semester. Through SIT, I completed a research paper entitled “Effects of the Jordanian Water Crisis on Public Opinion: A Case Study in Azraq.” In developing this thesis, I decided to use the survey and interview data I gathered in Azraq, as well as a combination of existing literature and theory related to resource access and environmentalism, to answer a different research question. This section is an explanation of how I gathered my survey and interview data in Jordan and how I related it to existing literature and theory to provide new insights into water issues within both Azraq and Jordan. These results also relate to the fields of water security, resource access, and political ecology.

As the topic for my original work was a question of how the Azraq community’s experience of the water crisis does or does not affect public opinion towards the government among locals, I set out to create a survey that would ask relatively broad questions on these topics and that would be relatively simple and quick to take. I made the survey a short twelve broad questions as I knew I had a time constraint of only one

day to travel to Azraq and complete the surveys, and because I wanted to make sure the survey was easily understandable to everyone participating. I developed the Arabic survey \ with my primary academic advisor, Dr. Isamel Abuamoud, and my program director, Dr. Raed Al-Tabini, as well as my language instructor, Mrs. Riham al-Naimat, who helped with translation. A full copy of the survey translated into English can be found in the appendices, though the questions essentially asked participants about their general information, the effects of the water crisis on their daily lives, and their views on governmental water policy in both Azraq locally and Jordan as a whole.

With the help of the same advisors, I also developed an interview script for farmers in Azraq, in which I asked them about the transformation of the agricultural sector in Azraq since pumping began, as well as how they feel the water shortage has affected their agricultural practices. For my interview with Dr. Al-Hreisha of the Azraq Wetland Reserve, I developed an interview script in which I asked him about the work of the Reserve, government policy in Azraq, as well as the most pressing issues facing the aquifer today and the effects of natural processes such as climate change on the oasis and surrounding community. For my interview with Dr. Adnan Al-Zoubi of the Ministry of Water and Irrigation, I sought to gain a governmental perspective on the water crisis and on pumping from the Azraq aquifer specifically, so I developed questions around these goals. Scripts from my interviews can also be found in the appendices of this article.

Ethical considerations were taken into account and all participants signed an informed consent form which confirmed their anonymity in the study and gave their consent to be used as a part of the study and its final results. The name of each participant was not asked on the survey. Interview participants also signed an informed consent form

that allowed them to choose whether or not their name would be displayed in the final project. All interview participants chose to allow their name to be displayed, though only two of their names are included in this study. Additionally, I completed a local IRB review through SIT to conduct my research in Jordan, and have completed an IRB through the University of Mississippi to use the data I gathered in Jordan as existing data in this article.

To deliver the study, I traveled to Azraq with my academic director's colleague, Mr. Abdullah al-Hweitat, an Azraq resident. I stayed with Mr. Abdullah and his family for one night, and spent the entire day and night of my arrival as well as part of the next morning administering surveys and conducting interviews around the community. Unfortunately, I was only able to gather a convenience sample that consisted primarily of Mr. Abdullah's acquaintances; this was unavoidable, as if I had attempted to administer the surveys without a local guide it is unlikely that I would have been able to gain the trust of anybody in the town. However, the sampling of the study is certainly a major limitation and made proving any causal relationships difficult. I do believe that my study with SIT laid some useful groundwork for future studies that have perhaps more time, money, and resources to conduct larger-scale surveys on the relationship between water and politics in rural communities. Afterwards, my advisor in Jordan, Dr. Abuamoud, helped me use SPSS to calculate the means, medians, and standard deviations of my survey data questions as seen in the tables in my Findings section.

When I began this project, I took a second look at my data collection about the water shortage and the relationship between water and politics in a place like Azraq and made connections between my own findings and existing literature. Primarily, I used

databases such as JSTOR or EBSCO to find articles about the physical properties of Azraq and the surrounding landscape, as well as the anthropological and geographical history of the area, which helped to give me a more complete reading of the town and the way that the community has historically reacted with both the aquifer and later, the state.

## IV. Findings

In the first part of the findings section, I highlight the results of my own personal observations and field research in Azraq. I particularly focus on political transformation in Azraq as well as changes in the physical landscape since government pumping began in the 1980's. I then discuss some of the future political implications of my own findings in Azraq as well as those of other authors, and the ways in which the case of Azraq can give insight to similar situations regionally and globally. Finally, I relate these findings to broader theories discussed in the literature review, particularly Ostrom's tragedy of the commons, Inglehart's postmaterialist thesis, and Tilt's counterargument of that thesis.

### *a. Physical changes in Azraq*

This subsection is a discussion of the physical changes brought about by over pumping in Azraq. In particular, this subsection shows what my observations, in tandem with existing literature, reveal in terms of historic physical changes in Azraq. Upon arriving in Azraq, I found a landscape very different from what I had expected. Though I knew the history of policy regarding the aquifer, I had not expected the landscape surrounding such a large body of water to be so barren. During my interviews with Chechen farmers whose families had been in Azraq for several generations, I saw pictures of Azraq from the 1960's and 1970's which, as I had expected, seemed to show a completely different

world from the one I was visiting. Pictures of a massive lake surrounded by lush greenery and wildlife, of people swimming, fishing, or herding water buffalo in the lake startlingly conveyed how much government pumping had changed the lives of the people in Azraq (Anonymous personal communications, 2018).

Existing literature highlights physical transformations in Azraq since government pumping caused drastic decreases in water levels beginning in 1981. Over the course of the last three to four decades the aquifer dried out, which led to changes both in Azraq's physical landscape and its wildlife. Once a thriving oasis, Azraq now looks strikingly similar to the desert that surrounds it and that is spreading across the landscape of Jordan. The road from Amman to Azraq is covered entirely by desert, but Azraq, Arabic for "blue," is supposed to be a refreshing break from the sand, a thriving oasis in the midst of the vast Jordan desert. However, unless one drives directly to the spot where the little remaining water in the aquifer is found, there is no indication that the Azraq landscape is any different from that of the other desert towns.

One incredibly detrimental physical consequence of the depletion of the Azraq aquifer is the loss of a variety of flora and fauna species that once inhabited the surrounding area. Several species of birds have changed their migratory patterns so that they no longer stop in Azraq, and many species of frogs, butterflies, and dragonflies have disappeared from the area. A species of fish that is known to live only in the Azraq oasis, *aphanius sirhani*, is now critically endangered. The rehabilitation of this species has become a main goal of the Azraq Wetland Reserve. This change in migratory patterns as well as the disappearance of species of various animals has been devastating on the ecosystem as well as on ecotourism to the area. Azraq once hosted a thriving ecotourism

industry that primarily revolved around bird-watching, but due to alterations in migration patterns this industry has become virtually nonexistent. The disappearance of the ecotourism industry has led to job loss and to changes in the roles of organizations such as the Azraq Wetland Reserve or the Royal Society for the Conservation of Nature in Azraq, which will be discussed later on (Al-Eisawi, 2005).

Some of my own findings and observations reinforce existing literature which discusses physical transformations in Azraq. For example, during my time in Azraq I was fortunate to interview Dr. Hazem Al-Hreisha, the manager of the Azraq Wetland Reserve. The Reserve was established by the Royal Society for the Conservation of Nature (RSCN) in 1978 in the hopes of conserving the oasis, and is now the main organization working in Azraq to both maintain water levels and rehabilitate species around the aquifer that are beginning to dwindle (“Azraq Wetland Reserve”). My interview with Dr. Al-Hreisha reiterates findings from Dr. El-Eisawi on the departure of migratory birds from Azraq. Dr. Al-Hreisha discusses this exodus of migratory birds as well as the near disappearance of several other animal species. He also frequently emphasized the restoration of these species and the natural ecosystem of the aquifer as the main goal of the Reserve (Al-Hreisha, personal interview, 2018).

My research also reinforces findings from Al-Naber (2016) which emphasize the effects of excessive pumping from the aquifer on the agricultural sector in Azraq. Additionally, Al-Naber discusses the importance of sustainable agriculture, a theme I also found while interviewing Chechen farmers. Negative effects on the agricultural sector include the loss of water for irrigation and the inability to raise certain livestock, such as water buffalo, since pumping from the aquifer reached its peak. Most of these farmers,

now over 60 years old, had grown up in the days before pumping and had learned agricultural practices when the water in the aquifer was still bountiful. Throughout their lives, as water levels in the aquifer have continued to deplete, these farmers have been forced to adapt to more sustainable agricultural practices, learn new ways to conserve water, and even abandon some crops and livestock altogether. My findings from speaking to farmers on the ground reinforce the impacts of excessive pumping as discussed by Al-Naber, and help to provide useful insight into the ways that pumping has affected both the Chechen community and the agricultural sector in Azraq as a whole.

*b. Political and social changes*

This subsection highlights the political and social changes in Azraq due to excessive pumping from the aquifer. First, over-pumping has had significant effects on public opinion in Azraq. In my previous study, I examined the relationship between the water shortage itself, government policy, and public opinion. In my 25 surveys and four interviews with local Chechen farmers, I asked questions regarding citizens' feelings towards how the water crisis has affected their daily lives, towards government water policy in Jordan and in Azraq specifically. A key finding from my research was that locals in Azraq tended to view national government water policy pertaining to Azraq less favorably than national government water policy in Jordan as a whole. This shows the significant role that water plays in Azraq and the political awareness it fosters. Survey participants were also generally supportive of conservation movements in Azraq and unsupportive of continued pumping from the aquifer.

As discussed in the methodology section, I conducted surveys over the course of two days in Azraq with the help of Mr. Abdullah al-Hweitat and his son Jaafar, who led me to their friends, neighbors, and colleagues around town and asked them to take the survey. All of the citizens that I talked to were rather eager to participate in the study, and seemed to be very opinionated about the issue of water in Azraq. As a whole, participants in the study saw water as an incredibly important political issue in Jordan and one that greatly affected their daily lives. This is demonstrated through the averages (means), medians, and standard deviations of the responses to two of my survey questions, as highlighted in Table 1:

*Table 1: The water shortage in the lives of Azraq locals*

Question	Number of responses	Mean response	Median response	Standard deviation
On a scale of 1 to 6, with 1 meaning, “non-important,” and 6 meaning, “very important,” how do you view the water crisis compared to other political issues in Jordan?	25	5.64	6	1.08
On a scale of 1 to 6, with 1 meaning, “no effect,” and 6 meaning, “major effect,” what kind of effect has the water crisis had on your daily life?	25	5.24	6	1.16

This data clearly shows the political significance of water within the Azraq community, and reinforces the findings of a study conducted by Janssens and Thill that describes water as the main link between the Jordanian state and Azraqi society. These two authors state that in the unique situation of Azraq, as a rural desert town whose main practical use for the national government these days is as a source of water for the rest of the country, water becomes the primary medium through which locals interact with the state and with the political process. Additionally, water and the way that both citizens and the state interact with it contributes to the formation of political opinion and identity within the community.

The results in the table above reinforce the findings of Janssens and Thill as they show that people in Azraq view water as a very important political issue - I did not conduct surveys in other parts of Jordan, such as Amman or rural areas in the south, but in Azraq, locals clearly view water as a very important political issue and one that drastically affects their daily life. Other findings from my surveys support Janssens and Thill's arguments as well, particularly the responses to the following questions:

Table 2: Opinions of government water policy

Question	Number of responses	Mean response	Median response	Standard deviation
On a scale of 1 to 6, with 1 meaning, "I do not agree at all," and 6 meaning, "I agree very strongly," do you agree with the government's water policy in Azraq?	25	2.72	1	2.23
On a scale of 1 to 6, with 1 meaning, "I do not agree at all," and 6 meaning, "I agree very strongly," do you agree with the government's water policy in Jordan as a whole?	25	3.88	4	2.22
How many times a week do you receive water from the government?	24	3.54	4	.66

Proving a causal relationship between government pumping and transformation in public opinion within Azraq is outside of the capability and overall aim of this study, but given this survey data I argue that government pumping from the aquifer likely

contributes to the development of public opinion towards the government and water policy more specifically. As the people of Azraq experience the water crisis in a unique way, logic and the data shown imply that this experience will help to shape the way they view the water crisis and policy surrounding it.

Another important takeaway from this data is the response to the question asking participants how often they receive water each week. Throughout the Kingdom, a weekly supply of water for drinking, cleaning, bathing, etc., is typically delivered to each household from the government a certain number of times per week. The tenants are then responsible for rationing their water so that they do not run out before the next delivery. An average response of 3.5 is rather high compared to Amman, where I observed that nearly all apartment complexes only received water once a week, with the most fortunate receiving water twice a week at most. This shows that Azraq locals are well aware of environmental issues despite receiving water more frequently than those in Amman. Governmental exploitation of the aquifer has affected life in Azraq as a whole in ways other than the frequency of household water delivery, as shown by this table. This in fact provides further evidence for my argument, as though Azraq residents receive more frequent water shipments than Amman residents, they still are very aware of the effects of aquifer depletion given the transformed landscape and society they live in.

A political issue that has arisen due to the water shortage in Azraq and in Jordan as a whole is illegal water extraction. People who I interviewed or surveyed, particularly Mr. Hezam al-Hreisha of the Azraq Wetland Reserve and Dr. Adnan al-Zoubi of the Ministry of Water and Irrigation, brought up illegal wells as a significant problem in Jordan. Dr. Al-Zoubi discussed the problems that illegal wells create for the government,

as it is difficult to know how much can be pumped from an aquifer when an unknown portion of water is also being pumped illegally. More research needs to be done regarding illegal wells and the significance of their impact on the Jordanian water crisis, though at the very least they are a political consequence of government pumping in Azraq. Reduced water levels in Azraq and the inability of the government to ration as much water to each household as before has led people to search for other means to access water, one of which is illegal extraction (Al-Zoubi, personal interview, 2018).

A potentially positive political implication of government over pumping in Azraq is increased environmental awareness and the rise of conservation movements. The Azraq Wetland Reserve is a very important organization to the Azraq aquifer and community and works to preserve the current water levels in the aquifer as well as preserve and restore certain wildlife species in and around the aquifer. The Wetland Reserve is a constituent organization of the Royal Society for the Conservation of Nature (RSCN), which establishes various projects and organizations in parts of Jordan designed to preserve the country's nature sites. The state of Azraq after over-pumping has undoubtedly contributed to public support for the Wetland Reserve and for conservation in general, which is a promising sign for the future of environmental policy in Jordan.

In one case, increased environmental awareness in Azraq led to a protest movement to stop a nuclear power plant from being built in the area surrounding Qasr Amra, a famous desert castle in Jordan built during the Umayyad caliphate. The protest's slogan was (translated from Arabic) "Amra is Umayyad, not nuclear." The movement also supported the establishment of solar or wind energy programs in Jordan in order to replace the need for nuclear power (محتجون: عمرة أموي مش نووي) [Protestors: Amra is

Umayyad, Not Nuclear]). However, this was the only case I was able to find of significant environmentalist action in the area.

These findings about Azraq itself show the way that over-pumping from an aquifer can have devastating political, economic, and physical consequences for the surrounding community and landscape. Government policy that does not adequately account for the sustainable yield of an aquifer and/or that does not give consideration to how an aquifer can be preserved while being used for its water can be severely detrimental to the aquifer itself. Additionally, illegal water extraction can make it difficult for the government to know how much water it can sustainably pump from an aquifer. More research is needed into how much water is being illegally extracted from Azraq and other water sources in Jordan at this time.

*b. Connections to theoretical literature*

This subsection is a discussion of the relationship between my own findings and observation and theoretical literature on two main theories: Ostrom's tragedy of the commons and Inglehart's post-materialist thesis. The findings I presented in this section, based both in my own observations and in existing literature on Azraq, provide useful insight into the application of various theories, particularly the tragedy of the commons and post-materialism, to the case of Azraq. Azraq provides a unique application of these theories in that it shows a community surrounding a common resource that is being extracted primarily by an outside party (the Jordanian government) as opposed to the citizens themselves, arguably resulting in greater environmental awareness due to the citizens' personal experiences of environmental degradation.

The Azraq aquifer was once a commonly shared resource, but as the need for water in Jordan rose, the government increasingly exercised control over Azraq's water. As my data shows, many Azraq locals resent the government's use of the aquifer and still view the aquifer as something that should belong to the people of the area. The situation in Azraq necessitates the question, "How are people affected when a common resource is seized and depleted by the government?" My answer to this question is that the effects of environmental degradation described in Elinor Ostrom's theory of the "tragedy of the commons" still occur even when a common resource is not being depleted by its surrounding population. As stated in the literature review, Elinor Ostrom (1990) states that the "'tragedy of the commons' has come to symbolize the environmental degradation to be expected whenever many individuals use a scarce resource in common (p.1)." Clearly, a stipulation when applying the theory of the tragedy of the commons to a particular case study is that the resource must be a "common," or shared, resource that only the members of the surrounding community have access to.

In Azraq, members of the community experience the negative effects of excessive groundwater pumping even though they are not legally able to pump from the aquifer themselves without specific licensing from the government. As the government continues water extraction from the aquifer, community members increasingly bear the brunt of environmental degradation. This environmental degradation, in turn, leads to shifts in society particularly regarding public opinion of the government and support for conservation organizations. One could in fact argue that Azraq presents a counterexample to the theory of the tragedy of the commons as it applies to shared resources, as the community of Azraq would likely have been better off had control of the resource

remained open to the community as opposed to the state. Alternatively, Azraq can simply be seen as a way that the same principle of the tragedy of the commons can be applied also to resources controlled and regulated by the state, as communities surrounding those resources will still experience the most negative consequences of environmental degradation, in this case water scarcity.

On the topic of the tragedy of the commons, one final issue worth noting is illegal water extraction. Illegal water extraction is considered by the Jordanian government in particular to be a major contributor to the continued water shortage. The government argues that knowing how much water can be extracted from the aquifer is difficult because it is unknown how much is being illegally extracted at the same time (Al-Zoubi, personal interview, 2018). Current research is insufficient in determining whether the government's statement here is accurate or is simply an attempt to place the blame on illegal extraction rather than on the government's legal extraction. Either way, illegal extraction is applicable to the tragedy of the commons as it shows a way in which citizens are managing to still extract from the common resource - and are in turn contributing to the environmental degradation of their own community. Taking illegal extraction into account, we see water in Azraq as a tragedy of the commons that involves to some degree both common and state access, though the state activity is much more significant than that of the community.

This thesis thus uses Azraq to create an expansion of the tragedy of the commons - resources extracted not only by the surrounding population but also by a state or national government can adversely affect the community surrounding the resource. The "tragedy" thus applies to all communities surrounding a resource being exploited by any

party, particularly if the resource is water, as water is necessary for life. In cases such as Azraq, where the government is exploiting the resource rather than the community, the effects on the community are perhaps worse, as they are experiencing all of the cost and none of the benefit. Were the Azraq aquifer a common resource and community members were free to use the aquifer as they saw fit, a system of extraction that did not harm the surrounding landscape or community could potentially be arranged. However, since the government prioritizes the provision of water to the rest of Jordan over the preservation of the Azraq landscape, the community receives even harsher blows in the form of environmental degradation and destruction.

My findings in Azraq thus suggest that a shared system of governance between surrounding communities and the state may be preferable to total control either by a community or by a state. This could involve quotas on extraction for both the community and the state, and granting of certain rights to the community such as using the resource for recreation or the maintenance of the resource for other economic sectors such as tourism. If shared control is unfeasible, consultation between the government and the community may be a way to ensure that the community experiences minimal effects of environmental degradation.

The other main theory I apply to Azraq is the postmaterialist thesis. As described in the literature review, the post-materialist thesis as coined by Robert Inglehart (1971) essentially describes a phenomenon in which as societies move into a state of “postmaterialism,” when citizens no longer have to devote most of their time and energy to simply staying alive, individuals thus have more time and energy to devote to other, non-material issues. These issues often concern concepts of social justice and, of

particular importance to this study, environmentalism. The theory of postmaterialism predicts that in Azraq and in Jordan as a whole, as most citizens are generally low-income and do not live in a state of post-materialism, they would not place much importance on environmental issues as they do not have the time or energy to do so. My findings, however, suggest that in Azraq, this is not the case, and in this section I argue that Azraq presents a counterexample to the postmaterialist thesis.

My data presented earlier in the findings shows that Azraq locals feel affected by the water crisis on a daily basis, and view the water crisis as a very important political issue in Jordan. Additionally, locals are very supportive of conservation movements and aware of the significant of the water crisis and government policy exacerbating it.

Undoubtedly, the experience of community members in Azraq with regards to the aquifer forces them to be well aware of these issues. Thus, in Azraq, it is not society's post-materialist status that makes it more aware of environmental issues, but in fact the opposite - the fact that locals in Azraq are generally low-income and many have historically depended on the aquifer for their way of life makes them more aware of environmental issues as they bear the brunt of negative environmental effects.

*Table 3: Income of Azraq locals*

Question	Total number of responses	Number of participants who answered "less than 1,000 JD (~\$1400)"	Number of participants who answered "more than 1,000 JD"
What is your monthly income?	21	21	0

The case of Azraq thus supports Tilt's idea of "empty-bellied environmentalism" that I discussed in the literature review. Tilt argues that post-materialism perhaps accurately explains concern for the environment in post-materialist societies but fails to account for roughly equal levels of environmentalism in societies that are not post-materialist. Thus, he states that two types of environmentalism, "full-bellied" and "empty-bellied," take shape in more-developed and less-developed countries, respectively. In a place like Azraq, empty-bellied environmentalism takes place because low-income community members who perhaps depend on the aquifer, cannot afford to buy more water, or cannot find a job because the depletion of the aquifer has transformed the economy of the town, become very concerned about the environment because of the drastic effects of environmental change on their daily lives. This causes formation of conservationist ideologies and increased environmental consciousness in the community, which my data supports.

## V. Conclusion

This paper has examined the case of Azraq within the context of existing literature on physical and political changes in the community, as well as the theories of the tragedy of the commons and post-materialism. Additionally, the findings of the study further the idea of water as an important link between state and society in Azraq as defined by Janssens and Thill. Overall, I found that the case of Azraq, having witnessed several societal and physical changes over the last half a century or so, provides new ways of understanding the tragedy of the commons and post-materialism in a world increasingly losing its water resources. In particular, my findings in Azraq show that citizens living near an exploited natural resource experience the negative effects of environmental degradation whether the exploitation comes from the community or from the state. Additionally, I argue that in cases such as Azraq, the effects of environmental degradation on a community surrounding a resource can be worse, as the community has no control over how much of the resource is being extracted, and is also unable to use the resource as it needs to. My findings suggest a shared system of governance between the state and the local community as a potential way to ameliorate the effects of environmental degradation on communities surrounding natural resources.

Azraq also provides a counterexample to Inglehart's post-materialist thesis as my findings indicate that those living in Azraq, a relatively low-income community that has not transitioned into a post-materialist society, in fact care greatly about the environment

due to the harsh impacts of environmental degradation on their daily lives. In this way, the tragedy of the commons and post-materialism intersect when one examines Azraq - as citizens surrounding a resource experience the environmental degradation that comes with the depletion of that resource, they will in turn become more environmentally aware due to their experiences. Additionally, negative opinions towards government policy and potentially the government itself tend to manifest themselves in these communities, which could lead to political clashes between the government and the communities surrounding exploited natural resources. Thus, creating new ways of governing natural resources that involve input from both those living around a natural resource and the state is important in decreasing both the potential for conflict and the physical, economic, and social impacts of resource depletion on local populations.

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## VII. Appendices

### *a. Survey Script*

(Q1) Gender: Male (1) Female (2)

(Q2) Age: Younger than 20 (1), between 20-29 (2), between 30-39 (3), between 40 and 49 (4), older than 49 (5)

(Q3) Monthly Income: Lower than 1,000 JD (1), Between 1,000 and 1,500 JD (2), more than 2,000 JD (3)

(Q4) Compared to other political issues in Jordan, how do you view the water crisis?  
Unimportant (1), Very important (6)

(Q5) How has the water crisis affected your daily life?  
Not at all (1), In a big way (6)

(Q6) Do you agree with the idea of pumping water from the Azraq aquifer to provide for the country?  
Not at all (1), Strongly agree (6)

(Q7) Do you agree that the agricultural sector has negatively affected the aquifer in Azraq?  
Not at all (1), Strongly agree (6)

(Q8) Do you support the current attempts to restore the Azraq aquifer?  
Not at all (1), Strongly support (6)

(Q9) Do you agree with the government's policies regarding the water crisis in Azraq?  
Not at all (1), Strongly agree (6)

(Q10) Do you generally agree with the government's policies regarding the water crisis in Jordan?  
Not at all (1), Strongly agree (6)

(Q11) How many times a week do you receive water from the government?  
Once (1), Twice (2), Three times (3), Every day (4)

*b. Sample Interview Script*

- (Q1) How has the water crisis affected your daily life?
- (Q2) What obstacles do you face in accessing sufficient amounts of water?
- (Q3) How do you store water in your house?
- (Q4) How has the water crisis affected the lives of those in Azraq and in the Badia in general?
- (Q5) How do residents of Azraq and the Badia cope with the effects of the water crisis?
- (Q6) In your opinion, what have been both the positive and negative policies from the government regarding the water crisis in Jordan?
- (Q7) In your opinion, how has the water crisis affected the opinions of Jordanians towards the government and its policies?
- (Q8) What are the government policies regarding the water crisis that you would support in the future?