Wishing for Water While Fleeing Their Farms: A Study of Water Scarcity and Internal Migration in Tunisia

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Wishing for Water While Fleeing Their Farms:
A Study of Water Scarcity and Internal Migration in Tunisia

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Abstract

How does water scarcity and limited water access impact internal migration? I argue that water scarcity and limited access to water is likely to increase internal migration in Tunisia. The mechanism through which I will investigate this relationship is in the agricultural sector. In this research, I found that water scarcity does exist in Tunisia and that scarcity impacts the economy, employment, and perceptions of rural areas in Tunisia. This, in turn, likely contributes to internal migration, although my research could not conclude whether water scarcity acts a causative factor to internal migration. This topic has become more prevalent than ever to study since climate change is altering rainfall and weather patterns and will likely contribute to the ongoing immigration crisis around the globe.
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Introduction

Tunisia, much like the rest of North Africa, is in a crisis. Over the last decade, rainfall has decreased and become volatile, leading to both prolonged droughts and flash flooding (Chebil et al. 2019, Knaepen 2021). The situation is unlikely to improve since climate models estimate that rainfall will decrease between 10% and 20% within the decade (Chebil et al. 2019). Tunisia has been particularly hard hit by water scarcity ranking 33rd in the world for countries most threatened by water stress while climate models predict a 28% decline in water availability by 2030 (Chebil et al. 2019; Kefi 2023). Polling conducted in 2022 found that only 19% of Tunisians are satisfied with current water quality which is the lowest satisfaction rate Gallup has recorded at the country level anywhere in the world since 2005 (Vigers and Sager 2023). This dissatisfaction is tied to over five years of drought and a record low rainfall in 2022 which saw just 20% of normal rain volume between September and December (Peoples Dispatch 2023; Vigers and Sager 2023). In the first months of 2023, conditions have only grown worse leading the government and their water distributor, Sonede, to implement water restrictions that began in April (Cordall 2023; Peoples Dispatch 2023). These restrictions include limited access to water between 9 P.M. and 4 A.M. and total bans on using potable water for watering lawns, cleaning streets, washing cars, or for farmland irrigation (Cordall 2023; Peoples Dispatch 2023). However, some rural and urban areas that are not supplied by Sonede remain unaffected by these new restrictions (Cordall 2023; Peoples Dispatch 2023). This lack of rainfall has led to an increased interest in groundwater. This interest has a number of issues of its own including an uptick in salination of groundwater along the coast and a cross border disagreement over the use of the Ghadames Basin which is shared by Tunisia, Libya, and Algeria (Cordall 2023; Fernández 2023; Peoples Dispatch 2023).
This water crisis in Tunisia comes on the heels of a country facing what scholars have called a Constitutional Coup or self-coup on July 25th, 2021, when President Kais Saied dismissed Parliament and assumed almost total control of the government (Yerkes and Alhomoud 2022). This crisis has been worsened in recent months with a record low turnout for Parliamentary elections, reaching only 11%, and a crackdown on opposition leaders, including the arrest of the primary opposition leader of the Ennahda, Rached Gannouchi, on April 20th on charges of plotting against the state (Amara 2023; Amara and Mcdowall 2023). This political uncertainty is further compounded by the immigration crisis which continues to deteriorate. Crossings between Tunisia and Italy in 2023 are up exponentially, with at least 12,000 immigrants reaching Italy by the end of March, compared to 1,300 last year, while the Tunisian Coast Guard prevented another 14,000 from leaving in this same period compared to 2,900 in that period in 2022 (Jones 2023; Macaulay 2023). This increase has had deadly consequences since hundreds have died or gone missing while attempting to make this crossing, including two boats that capsized on March 26th claiming the lives of 29, and a series of sinkings near Sfax that claimed nine lives and left another 67 missing (The Associated Press 2023; Jones 2023; Macaulay 2023). Even more recently, 210 bodies of migrants washed up on the Tunisian coast in a period of ten days and caused morgues and hospitals in Sfax to fill to capacity (Al Jazeera 2023; Bouazza 2023). This uptick in illegal crossings comes after a fiery speech by President Saied in which he claimed Sub-Saharan migrants are the root cause of many of Tunisia’s economic woes (Macaulay 2023).

Turning inward, economic issues have plagued Tunisia recently leading to inflation and food shortages (Pavia 2023). Foreign governments have begun to worry about a total financial collapse in Tunisia due to their heavy debt load and their inability to pay back foreign creditors
which could lead them to default on their loans (EURACTIV with Reuters 2023; Pavia 2023). This is compounded by President Saied holding up an IMF loan to the country due to the structural adjustment policies attached to it (Pavia 2023). These would include cutting food subsidies, which would increase food costs and likely disproportionately harm the interior portion of the country (Pavia 2023). However, if Tunisia did default on their loans, many fear that schools and hospitals would close, and the government would not be able to pay for government employee wages (Pavia 2023). This financial crisis will likely come to a head by August 2023 which is when most scholars predict Tunisia will default on its loans without a bailout (Pavia 2023).

This context helps to paint the myriad of concerns which currently plagues Tunisia and helps to explain why I would like to study the issue of water access and how it connects to internal migration. Having now lived in Tunisia for almost three months, I have seen how economic concerns, internal migration, and food shortages impact people on a daily basis. In many ways, water access touches on all of these issues while also compounding these fears for many Tunisians. Access to water is also recognized internationally as a human right, yet issues like scarcity and government restrictions inhibit access to this necessity. This makes the topic of water both pertinent and fascinating to me. Connecting water scarcity to internal migration and agriculture also makes sense since I come from a rural background and know how important natural factors, especially rain and water, are for agriculture. If nature does not deliver what is expected and what was delivered in the past, this leads to financial hardships and a feeling of hopelessness among the rural community. This crisis leads to a number of issues, one of which could be internal migration.
For the scope of this paper, I will be focusing on internal migration specifically in Tunisia. Internal migration is described as individuals leaving their current place of residence and moving elsewhere within the same country. This is distinct from immigration in which individuals leave their home country for another country. Internal migration is also distinct from internally displaced persons (United Nations 2023) since the latter are forced to leave their homes for safety due to violence or armed conflict (United Nations 2023). My research will be digging into this question of what causes individuals to leave their home in favor of another place within the same state. As my review of existing literature on internal migration will show, there are a myriad of motives that can urge people to leave their homes. In this vein, I hypothesize that issues related to water access and water scarcity are likely to increase internal migration in Tunisia through the agricultural sector. However, before digging into this hypothesis, a review of the existing literature must be conducted on the two major components of this hypothesis water access and internal migration.
Review of the Literature

Since this topic spans across two major bodies of literature, internal migration and water access or scarcity. These two components will be thoroughly discussed by reviewing the literature. The literature on internal migration is quite vast, but it typically begins with a discussion of push and pull factors and migration. Almost all scholars acknowledge that factors impacting the decision to move are complex and do not hinge on one factor (Bhagat 2010; Carte et al. 2010; Chowdhury et al. 2012; Lucas 2015; Ocello et al. 2015; Zhang and Zhuang 2019). Lucas (2015) points to ten major factors that contribute to internal migration first dealing with rural-to-rural migration. Lucas argues that rural-to-rural migration is more common if migrants are unable to acquire new skills. This pushes migrants to move to rural spaces similar to their own to maintain similar jobs, but to also attain better opportunities. Return or cyclical migration is also common in rural areas and typically consists of migrant workers moving from rural area to rural area to follow the crop cycle (Lucas 2015). Another factor that pushes rural to rural migration is family stability. Large families are more likely to be able to stay together in rural spaces, since housing and land is more accessible, than in urban spaces (Lucas 2015). Poverty also acts as another factor in rural-to-rural migration since families may not be able to afford to move to a city but could afford to move to a rural space they perceive is better than their own (Chowdhury et al. 2012). The final factor that Lucas (2015) finds is not intrinsically linked to rural-urban migration is war or internal violence. If fighting is occurring in cities, then there may be a reverse flow of migrants from urban spaces back to rural spaces (Lucas 2015). Rural areas could also be perceived as safer if the threat is present in cities, but the inverse would be true if the threat comes from rural areas.
While these factors are important to study in terms of causes of internal migration, they have less bearing on my specific topic of study, rural to urban migration in Tunisia. I will now need to focus on factors more relevant to the Tunisian case. Lucas (2015) first argues that development of industry in cities pushes the state away from agriculture and pulls individuals to cities to find work. This factor directly contributes to Lucas’s next factor which is the urban-rural wage gap (Lucas 2015). This wage gap means that since industry has appeared in cities, then the wages will be higher which pulls migrants to cities. Lucas (2015) also argues that individuals are drawn to cities since simply being in the city increases the individual’s ability to find a job. Aside from economic and career-oriented migration, this attraction to urban spaces can also be seen in two other factors (Lucas 2015). First, the proximity to amenities such as access to transportation and healthcare which is likely more prevalent in cities than in rural areas (Lucas 2015). Second, the proximity and access to a decent education act as a pull factor to urban areas if the education in the rural area is poor or education in urban areas is at least perceived as being superior (Lucas 2015).

These factors make up a large part of the groundwork of what scholars believe contributes to internal migration, but other scholars have expanded on these factors. For example, Chowdhury et al. (2012) found that poverty is one of the major factors that pushes migrants to cities. Poverty is a push factor, while amenities, services, and better jobs then act as pull factors within an urban space. However, Chowdhury et al. (2012) acknowledge that poverty can also act as a prohibiting factor to migration since it traps individuals making them unable to escape their situation. Bhagat (2010) somewhat disagrees with this point arguing that business and employment opportunities and education are the largest factors that contribute to internal migration and that poverty is not part of this process since it acts more as a prohibiting factor.
than a push factor. Carte et al. (2010) concur that most internal immigration is from rural to urban spaces but argue that perceptions are the driving force behind this decision. They argue that neoliberal reforms in states focus on economic revitalization in cities and downplays the importance of rural areas and undervalues the role of agriculture in the economy. These policies consolidate the perception that agriculture is a dead-end profession and that in order to succeed, individuals must migrate to cities to make a living (Carte et al. 2010). This is further exasperated if the state relies on tourism since tourism typically offers the largest number of job opportunities in urban spaces. This creates the perception that the states goals are to attract tourists and not focus on bygone industries like farming (Carte et al. 2010). This is problem is further grown by rich upper-class individuals purchasing massive swaths of rural land to live on which contributes to the perception that agriculture is no longer profitable. This is in addition to the wage gap between agriculture and urban industry which makes the situation even more hopeless for many (Lucas 2015).

Another factor that further exasperates this relationship between farming and migration is climate change and natural disasters. Changes in crop patterns and livestock related to climate issues not only decreases wages, but also increases the perception that farming is a hopeless industry (Carte et al. 2010; Lucas 2015). Short term disasters like droughts and floods also cause massive damage, but scholars argue that these disasters are more likely to trap individuals who wish to migrate rather than push them to move (Lucas 2015). Generally, in the field dealing with environmental factors and internal migration, there are two sets of major camps that divide much of the literature. Zhang and Zhuang (2019) break down the first set into what they call maximalists and minimalists. Maximalists believe that environmental issues make up the single largest cause of migration while minimalists believe that environmental factors are just one of
the background factors behind the real causes of migration (Zhang and Zhuang 2019). The other major break is discussed by Ocello et al. in 2015. They argue that scholars are broken into camps believing that environment does increase migration (Affifi and Warner 2008; Kniveton et al. 2008) and those that believe in the environmental scarcity hypothesis (Findley 1994; Henry, Schoumaker, and Beauchemin 2004; Paul 2005). This hypothesis states that the environment decreases migrants’ ability to migrate and that, in some cases, natural disasters have no impact on migration (Paul; Ocello et al. 2015).

This theoretical division is likely driven by empirical findings that complicate, and in some cases, contradict one another. For example, Ocello et al. (2015) found that floods and droughts deter internal migration in rural areas. However, they also found that these disasters impacted those with lower education more which increased their likelihood of immigrating. Zhang and Zhuang (2019) had similar findings arguing that soil erosion in rural areas had no correlation to internal migration, but that it did impact poverty levels. Chowdhury et al. (2012) go even farther, arguing that migration is driven by socio-economic concerns and access to amenities and is not impacted by environmental issues. Carte et al. (2010) falls into a similar position, arguing that it is the perceptions and values surrounding rural areas that contribute to migration and not environmental problems.

However, other scholars have made very different discoveries. Zaveri et al. (2021) argue that water specifically is the single cross cutting issue behind all of these factors. They find that cumulative water deficits in locations are five times more likely to lead to migration than water excess. They also find that rainfall decline contributes to income decline which can lead to internal migration (Zaveri et al. 2021). Zaveri et al. (2021) also found, similar to the findings of Ocello et al. (2015), that water shortages impact individuals with lower skills more than skilled
workers. They also acknowledge that water scarcity can act as a prohibiting factor to move, but that migrants will still find a way if they want to move. For example, in a study by Bryan, Chowdhury, and Mobarak (2014), they found that giving prospective migrants a week’s wage increased migration by 22 percentage points. Zaveri et al.’s study from 2021 also found that in areas where there is consistent irrigation for crops, there is a less out-migration than in areas with poor or without irrigation. However, irrigation is even problematic since it creates unnatural growing patterns and dependence on certain crops which could damage farmland in the long run. Chebil et al. (2019) also found that lack of water decreases future employment opportunities especially in rural areas. Since at least a theoretical connection between internal migration, agriculture, and water access can be seen through this examination of the literature, it is important to focus on literature pertaining to water access to find out about the different problems with measuring access, what categories of people are impacted by access issues, and how they are affected differently.

Resource or water access, like internal migration, is a large field where scholars have a plethora of debates. The first major debate centers on the following question: who has access to resources? Mason (2015) argues that scholars are faced with an issue from the outset in the measurement of whether individuals have access to resources. Governments may inaccurately report the resource access or may not know the full extent of access (Anand 2017; Das and Skelton 2020). This shows that there is a gap between government narratives, outside reports, and reality that must be considered when discussing resource access. In terms of what groups receive access to resources, many scholars agree on several points. First, urban residents generally receive the best access to resources, typically at the expense of rural residents (Anand 2017; Das and Skelton 2020; Kayaga et al. 2009). In terms of water access, governments may
divert water from rural areas in favor of urban areas to attract businesses and appease the elite (Anand 2017; Das and Skelton 2020).

However, not all urban residents experience equal access. Peri-urban areas on the outskirts of cities and informal settlements receive little to no access to resources when compared with other urban residents (Lim and Das 2022). From a socio-economic perspective, scholars have found that upper class individuals and elites receive the best access to resources along with major businesses (Das and Skelton 2020; Lim and Das 2022). The former may receive access, especially in privatized systems, because they are able to pay for the best access since private companies will focus on customers who can pay for services over those who are unable to pay (Lim and Das 2022). This issue leads to further separation between the economic classes since lower class individuals may have to focus their time on gaining access to resources to survive over working and accumulating wealth (Anand 2017). The issue of access is compounded when residents are on the fringe of society with little political power to begin with in cases such as peasants or indigenous communities (Spronk 2007).

Even when individuals can have access to these resources, scholars have found that they can have problems with the quality of the resource distribution process itself. Mason (2015) argues that governments are not always truthful when reporting resource access which leads to measurement difficulties, while Kayaga et al. (2009) argue that accurate measurements of resource usage is difficult for any government to accomplish regardless of their truthfulness. These measurement difficulties are compounded by low quality and quantity in service since these issues also fall through the cracks in government reports (Mason 2015). In India, the government considered locations in peri-urban settings to be attached to water lines, but people on these lines only had access to water for 15 to 45 minutes every other day (Das and Skelton 2020).
This shows one glaring discrepancy between government claims on resource access versus the reality of the situation. Physical infrastructure can also present challenges because pipes or electrical lines may be present, but the former may leak, and the latter may have illegal connecting lines attached to siphon power off the main lines which impedes access (Vij et al. 2019; Nastar 2014). These same studies found that in the Indian case, 30-33% of water was lost in the delivery process due to outdated and faulty infrastructure (Vij et al. 2019; Nastar 2014). Other quality issues exist such as water pollution or low quality or undrinkable water (Vij et al. 2019). These findings underscore the significant discrepancy between reported access and the reality of access of resources.

The final major resource access issue is the question of private versus public owned utilities. Private companies are inherently more prone to focus on customers who can pay and may ignore complaints from individuals who cannot pay, since they are profit driven and lack full government oversight and the threat of removal from office through elections (Anand 2017; Das and Skelton 2020). Since companies focus on payment, this extends resource access to elites and businesses, but leaves out individuals on the fringe of society and of the lower classes. However, other studies have found that governments face similar issues in providing services such as issues in Bolivian water provisioning that led leaders to privatize both water and sewage and in Uganda where the government was harshly criticized for poor water services (Spronk 2007, Kayaga et al. 2009). While both public and private methods have their share of issues, Lim and Das (2022) found that transitions from public to private oversight may cause structural and service issues, especially in early years of the service which further impedes access to resources.
Finally, two factors compound water access issues: internal migration and urbanization. Internal migration, in this context, is caused by taking resources from rural areas and diverting them to urban areas for usage (Anand 2017; Das and Skelton 2020; Weintal et al. 2015). This leads rural residents to lose access to resources, which drives them to migrate to cities and causes even more resource shortages since any population growth in urban centers strains the already-strained resource infrastructure (Anand 2017; Das and Skelton 2020; Wallace 2013; Weintal et al. 2015). This then becomes cyclical since as more people leave rural areas for urban centers due to lack of resources, the government must increase extraction of resources from rural areas to meet demand which further undercuts rural residents and causes their migration (Anand 2017; Das and Skelton 2020; Weintal et al. 2015). Plus, when these individuals from rural areas move to urban areas, they typically settle in highly concentrated informal settlements that already have limited access to resources (Anand 2017; Das and Skelton 2020; Lim and Das 2022). This cycle feeds off itself and leads to excessive extraction which only serves to bind the government to an unsustainable practice. This could lead governments to create what Anand (2017) calls “scare cities.” This is when the government fabricates water scarcity to some level which creates limitations on water access and serves to control the population. This is even more difficult to discern when actual water scarcity is present in a state which makes legitimate concern over sustainable water use and the creation “scare cities” almost impossible to untangle from one another.
Theory

After examining other scholar’s work on the two components of my topic, I have found a few gaps that I hope my research will be able to fill. First, while there is a significant amount of research completed discussing environmental concerns and immigration, most of it does not cover water access issues and scarcity. My research hopes to uncover both the issue of scarcity and the issue of access in rural Tunisia. Second, most sources examine direct reasons for immigration, economic concerns, access to jobs, and poverty, and fail to examine the cross-cutting factor behind many of these issues which is water scarcity and lack of access to water. This study will thus discuss how water impacts the economy, job access, and perceptions of rural areas through the lens of the agricultural sector. Most research conducted in the field of water access discusses who has access to resources and what problems go along with access issues, but they fail to fully discuss the direct implications of water access on the people impacted and if this can impact migration. Thus, my research will examine if water access impacts internal migration through agricultural means.
Methodology

My research was initiated through a discussion on the issue of water scarcity with an expert on the water situation in Tunisia, Rawe Kefi. She drew my attention to the link between water scarcity and its links to internal migration in Tunisia. Due to my interest in the issue of water and previous research that I started on, I thought that this would be a pertinent and interesting topic to research while in Tunisia. Now this project operated in a slightly different manner than my previous work since most of my previous research focused on water access in cities, but I decided to broaden my research to study rural access to water and how water scarcity impacts the daily lives of Tunisians. Thus, my main task in this paper is to test whether or not water access impacts internal migration. The research is going to be done through a two-prong approach.

The first prong is to dig into the quantitative literature on my topic. The first component of my research I will focus on is the issue of water scarcity and water access. Through the discussion I had with Rawe, I was able to build a firm bedrock of sources on water scarcity and climate change specifically in Tunisia. From these sources, I was able to dig deeper using online search engines to specifically examine how Tunisia stands compared to other countries in the world and in comparison to the Middle East-North African (MENA) region. Also in regard to this research, I looked into more updated sources surrounding water access since it has been a major story in the news which provided current numbers on rainfall and scarcity in 2023 as well as the government response to this scarcity. These sources helped to fill the research gap since no scholarly articles have been published that cover the water situation in Tunisia over the last 5-6 months. I am also going to utilize quantitative sources dealing with internal migration. This portion of my research proved far more difficult than the first component of my topic since few
studies exist examining how prominent internal migration is in Tunisia. News articles and most scholarly articles focus exclusively on the immigration crisis between Tunisia and Italy which leaves a void in the field of internal migration in Tunisia. For this reason, my research relies more on specific quantitative tools to examine water scarcity while relying more on oral interviews when discussing how significant internal migration is in Tunisia.

The second prong relies on a qualitative approach based on interviews with several different individuals. The first group of interviewees are specialists in Tunisia on water access and migration. Rawe was the logical first choice to interview since I had already made a connection with her, and I could form questions based on her presentation. After this, the decision of who to interview followed more along the lines of the snowball method. Rawe recommended one of her colleagues that both had personal ties to farming and the scholarly element of climate change in Tunisia. Next, both from her presentation and from the help of my academic director, I had an interview with an expert on water from the University of Tunis. Aside from experts, Rawe also planned an interview with a farmer in the Cap Bon region of the country who has personally been impacted by climate change and shifting labor markets. Interviews with these four people thus makes up the bulk of my qualitative research.

Going into the interviews with the specialists, I was somewhat unsure how to ask questions since all three specialists knew my research question and my general hypothesis before the interview. While this is somewhat problematic from an ethical point of view, it was necessary to give them this information in order to secure an interview and to spend the most time engaging directly with my question. It also allowed more space for the interviewees to discuss their thoughts on water scarcity and migration while also providing them time to brush up on their topic before the interview and provide further sources to examine. It also allowed me to
continue asking follow-up questions after the interview over WhatsApp to clarify points each interviewee made and follow up on some sources they cited but had not yet provided. This clarification bolsters the accuracy of my work. While I acknowledge this is a limitation in my research methods, it was necessary to engage in meaningful fieldwork and secure interviews for this project.

Another small issue that arose was one of confidentiality. The scholars I interviewed allowed me to use their names and even encouraged me to reference their specific non-profit in my research. This is somewhat less problematic confidentially as they are experts in the field or operate public businesses such as non-profits and wish to be associated with in this research. The more problematic interview in terms of confidentiality came from the farmer, Jamil. He wanted to be fully identified in my work in order to prove his engagement and commitment to fight for his farm and his community. Due to confidentiality concerns, we agreed to only publish his first name in this study while still redacting his last name to preserve his confidentiality.

While the second prong of my research offered me the opportunity to interview several significant individuals that provided insight into many different parts of my research, several problems inhibited certain elements of this work which must be noted. The first major issue was both time constraints and the actual timing of the project. From the time constraint perspective, we only had approximately four weeks to finish developing the research plan, collecting data, and writing the whole work which prohibited some parts of a fully encompassing study. If I had more time, I would have interviewed at least 10 farmers from around the country in every region to see how water scarcity impacts farmers regionally and if this regionality is impacting migration. I also would have found ways to interview farmers who had moved both to urban areas and to other rural areas and examine why they made the decision to move. However, due to
time constraints, one interview had to suffice and represent farmers at large in Tunisia. Due to time constraints, I have also opted for online interviews and emails in order to collect the data. The timing of this project was problematic. I started doing my research during Ramadan so the first two weeks of work, was unable to conduct interviews since most of the people I wanted to interview were either out of the office or slow in responding. This issue was compounded by the week following Ramadan in which most people went back to work and faced a full scheduling catching up on commitments.

Apart from time constraints, the language barrier was a significant challenge. Since most people speak Arabic and French here, I needed a translator to conduct interviews especially with older farmers or people in rural areas. Due to time constraints because of Ramadan, I only had the opportunity to interview one farmer with my academic director translating. The second major issue that impacted my research was transportation. Public transportation in Tunisia connects the major cities, but since my research focuses on rural areas, this made accessing these areas nearly impossible without a several hundred-dollar Bolt ride, a multi-hour bus ride, or knowing someone with a car willing to drive hours outside of Tunis. Luckily, my academic director, who also translated, was able to take me to Menzel Bouzelfa, about an hour and twenty minutes outside Tunis, to meet with a farmer and walk around his farm.

The final major issue that prohibited further research was the safety concern. In a country where terrorism is still a threat especially to Americans, there are many areas which could not be visited. Since many of the largest water problems occur in the South of the country and this appears to be where much of the internal migration is coming from, it would have been essential to visit this region to conduct interviews. Conducting research in other major agricultural areas around the border of Libya or Alegria or in the center of the country near Sidi Bouzid were all off
limits due to the risk of terrorism or cross border violence. The security issue, coupled with the transportation and language issues, restricted my infield research to the Northeast coastal area, the Cap Bon. This area contains a high concentration of farms and has more rainfall and better water access than most of the rest of the country which could have offered an opportunity to conduct more and deeper research by examining regional divides. With these limitations in mind, we will now turn to my research and findings which have been compiled over the last month.
Research Findings

In this portion of my work, I will discuss each component of my research in turn beginning with the issue of water scarcity and water access before turning to how scarcity impacts agriculture and how this may impact internal migration. The presence and reality of climate change is a well-documented phenomenon that was briefly discussed in the introduction to this work. Multiple scholars have found that climate change has already begun to impact water resources in Tunisia as rainfall has become inconsistent meaning that prolonged droughts and flash flooding are common occurrences (Chebil et al. 2019; Knaepen 2021). Tunisia is currently ranked 33rd in the world in terms of countries most threatened by water stress and has witnessed five years of drought and record low rainfall in 2022 which saw only 20% of the normal rain volume between September and December (Kefi 2023; Peoples Dispatch 2023; Vigers and Sager 2023). Looking ahead, the situation is not likely to improve since climate models estimate a 28% decline in water availability within this decade (Chebil et al. 2019). Climate change has also contributed to the rise in temperatures which compounds the issue of water scarcity since water consumption increases when temperatures rise (Zouabi and Peridy 2015). Many farmers and scholars have also noted that climate change has contributed to a change in seasons (Jamil 2023; Knaepen 2021). One farmer, Jamil in the Cap Bon region of Tunisia, argued that in the past, there used to be six to eight months of rain in Tunisia, but now there are only about four months of sparse rain which leaves many Tunisians without water (Jamil 2023).

During past times of drought in Tunisia, individuals turned to groundwater stores to make up for lack of rain, but five years of drought has meant that groundwater stores are being overused (Jamil 2023; Kefi 2023; Knaepen 2021). Overused groundwater sources are problematic since it increases the risk of contamination by saltwater and limits the sources’
ability to recharge through natural means (Jamil 2023; Kefi 2023; Knaepen 2021; Mouri 2023). Using tainted water over time contributes to soil erosion and some estimates say it could take less than five years to erode once fertile farmland is even mildly tainted water is used regularly (Jamil 2023; Mouri 2023). Scholars estimate that there are at least 20,000 illegal bore wells into groundwater stores which are unaccounted for by the government which poses the threat of overuse since they are unregulated (Kefi 2023). Declining groundwater stores can be seen by farmers such as by Jamil, a farmer in Cap Bon, who noted that he used to be able to hand dig wells 30 feet deep and find water, but now he must bore over 150 feet into the Earth to find water which is an unaffordable practice for many small farmers (Jamil 2023).

While scarcity and depleted groundwater stores pose a massive threat to water access for all, rural areas are particularly hard hit due to government policies which decrease access to water. Most scholars (Belwaer and Kefi 2023; Kefi 2023; Knaepen 2021; Mouri 2023) believe that water policies in Tunisia are mismanaged and that this mismanagement contributes to access issues especially in the interior and rural portions of the country. Many of these inequalities date back to immediately after Tunisian independence when efforts were made to develop urban areas through industry while completely ignoring rural areas leading to developmental inequality (Belwaer and Kefi 2023; Kefi 2023; Mouri 2023). Since lack of water is tied to lack of development, these inequalities have only grown over time placing rural areas at a total disadvantage to accessing water resources even though many rural areas in the North of Tunisia are the producers of water (Kefi 2023; Mouri 2023). Government policies that damage rural areas include placing an emphasis on water access for urban centers which means diverting water from rural areas to urban areas which leaves many rural areas without water even though they produce it (Chebil et al. 2019; Schwoob and Elloumi 2018). The government also has policies
which favors tourism, urban areas, and industry in times of scarcity leaving rural areas and agriculture out of the equation (Chebil et al. 2019; Knaepen 2021). This policy will become even more problematic moving forward as urban areas grow leading the government to extract more resources from rural areas (Anand 2017; Das and Skelton 2020; Wallace 2013; Weinthal et al. 2015). Recently, the government has implemented water reductions and even times when services will be cut nightly (Cordall 2023; Peoples Dispatch 2023). This policy leads both to confusion and anger since, when visiting Jamil in the Cap Bon region, their water was cut off at noon without warning (Jamil 2023). It led him to joke that if they relied on government water, they would never shower or wash anything, but these uncertainties pose challenges to farmers and non-farmers alike (Jamil 2023).

Dissatisfaction with these policies and climate change awareness are on the rise in Tunisia which contributes to perceptions surrounding water scarcity. Scholars have noted that over 300 protests occurred in 2022 in rural areas surrounding water policies the government implemented and water cuts (Mouri 2023). Other research has found that 80% of farmers aged 24-80 believe that water scarcity is tied to climate change in some manner with 76% saying climate change has an extreme impact on water scarcity and another 14% saying it has a medium impact on water scarcity (Belwaer and Kefi 2023; Réseau Enfants de la Terre 2023). Further research has shown that while the majority of rural Tunisians believe that climate change is impacting water scarcity, a majority say that there is little environmental consciousness in their area while 89% say they are not satisfied or not completely satisfied with the government’s current water policies (Réseau Enfants de la Terre 2023). This same study also shows that 66% of farmers have noticed a change in soil quality recently with soil becoming higher in salinity and more acidic making it difficult to grow crops (Réseau Enfants de la Terre 2023). This study
also found that 86% of farmers claim that disease among livestock is on the rise and 89% link this increase to climate change and water scarcity (Réseau Enfants de la Terre 2023). These findings show that water scarcity is both present and known in rural areas and impacts multiple parts of rural life.

Many of the issues surrounding water access, and complaints about water access, are due to the poor infrastructure in Tunisia. One estimate places the amount of water lost due to poor infrastructure in Tunisia at 30% (Mouri 2023). This is due to outdated piping, some of which dates back to latter half of the nineteenth century, and the inability of the government to repair these issues (Mouri 2023). The government has also attempted to open desalination plants, but even some of these have become outdated and opening more or repairing existing structures poses too high of a financial burden for the state (Dare et al. 2017). Since these plants are located around the coast, they also tend to supply water predominantly to urban customers further alienating rural Tunisians (Dare et al. 2017). A recent push has also been made to start using reuse water to combat scarcity (Mouri 2023). Currently, this system only accounts for 5% of water distribution in Tunisia, with hopes to be at 30% of distributed water by 2030 but poses significant environmental risks to farmers (Mouri 2023). Studies show that since most of the water is not treated properly, farmers that used reuse water on their crops attracted insects, due to the filthiness of the water, which destroyed much of their crop (Mouri 2023). These outdated infrastructure issues in rural areas become even more difficult to study since government reports claim that 90% of the rural population has access to clean, drinking water, when in reality that number is only about 60% due to outdated and unused water systems (Mouri 2023).

Up to this point, my research has discussed how climate change has led to water scarcity and how government policies and poor infrastructure impact access issues, but I must now turn
to a discussion of how water scarcity impacts farmers specifically. First, a brief discussion of the significance of farming in Tunisia is needed to display the extent of the farming industry. Agriculture accounts for about 8% to 12% of the GDP of Tunisia and between 15% and 16% of the total labor force (Belwaer and Kefi 2023; Chebil et al. 2019; Knaepen 2021). From the land perspective, approximately 30% of the land in Tunisia is arable while another 27% is used as pastureland for livestock (Knaepen 2021). Farming in Tunisia is defined by land inequality, with 54% of farmers holding farms that are less than 5 ha each while 1% of farmers control over 22% of the land (Schwoob and Elloumi 2018). This discrepancy leads to inequality between farmers with the large, wealthy farmers using most of the water resources because most small farmers rely on rainwater solely (Mouri 2023). In terms of water use, agriculture accounts for about 80% to 85% of all water use in Tunisia (Knaepen 2021; Mouri 2023). This fact shows how reliant the Tunisian agriculture sector is on water which is why it remains highly vulnerable to climate change.

Climate change, as seen before, has led to water scarcity which is now impacting agriculture in Tunisia. Chebil et al. (2019) argue that the impact of climate change on agriculture is uneven and much more pronounced than in other sectors of the economy. Scholars have found that all crop types in Tunisia are negatively impacted by climate change, although some crops are more vulnerable than others (Chibani 2022; Knaepen 2021; Zouabi and Peridy 2015). Cereals, olives, and citrus are among the types of produce most impacted by lack of rain and water scarcity (Chebil et al. 2019; Knaepen 2021; Zouabi and Peridy 2015). Low rainfall and water scarcity impact not only the quantity of the harvest, but also the quality of the crop which has been significantly reduced in the last five years (Belwaer and Kefi 2023; Jamil 2023). Low harvests also impact other part of agricultural life with hay costs rising dramatically which makes
raising livestock too expensive for most small farmers (Jamil 2023). This problem is compounded by the practice of monoculture which has depleted much of the farmland and increases the need for irrigation (Knaepen 2021). This helps to demonstrate the major inequalities present between farmers and even crop types in Tunisia.

Irrigation poses both a potential reward and threat to farmers in Tunisia. As Knaepen (2021) argues, monoculture increases the need for irrigation which, in turn, reinforces this practice which significantly degrades soil quality. However, in Tunisia, the issue of irrigation is rather limited since it is only affordable for large farms who use the majority of water that is used for agricultural purposes leaving small farmers out (Belwaer and Kefi 2023; Mouri 2023). For this reason, only about 8% of farmland in Tunisia is fully irrigated, but this farmland accounts for 35% of the market value of agriculture while also producing 20% of the total agricultural exports and 27% of agricultural employment in Tunisia (Chebil et al. 2019). About 48% of water used for irrigation comes from groundwater sources, increasing the overexploitation of this source (Chebil et al. 2019). Water efficiency in irrigation is also quite low, estimated at 55% of the potential capacity for sustainable practices, while only 69% of irrigation systems have technology in place to try and use water efficiently (Chebil et al. 2019). One study found that farmers surveyed said that there is a limited spread of sustainable agriculture and a majority said that even if they had access to this technology, most would be unable to use it (Réseau Enfants de la Terre 2023). This economic and practical discrepancy also shows how much of a difference there is in crop yield and output when considering how accessible water is from irrigated versus non-irrigated land.

Irrigated water makes up the minority of water in Tunisia with estimates claiming that at least 93% of farmland in Tunisia is reliant on rainfall to some degree with about 40% of this land.
being totally reliant on rainfall (Belwaer and Kefi 2023; Chebil et al. 2019; Knaepen 2021). As rainfall has become volatile, crops have suffered which harms the quality and the quantity of the crops (Jamil 2023; Kefi 2023). Scholars found that even if the timing of rain is different than previous years, it can damage crops by destroying buds if extreme rains come when plants are blossoming or by diminishing produce if they do not have enough rain during the peak growing period (Belwaer and Kefi 2023; Kefi 2023). The reliance of crops on rainfall goes even further with estimates claiming that Tunisian olive production will fall by as much as 50% by 2030 if current rain trends persist (Knaepen 2021). Scholars also argue that Tunisia already has a low capacity to adapt to changing climate and that rural Tunisia is being impacted the most currently by changes in rainfall which will only grow worse in the coming decades (Kefi 2023). With non-irrigated and irrigated water sources struggling, impacts will be felt across Tunisia in the realm of food access, the economy, and employment from water scarcity.

Food scarcity in Tunisia is already problematic with poor growing seasons there and abroad driving up the cost of food while the supply dwindles (Kefi 2023; Knaepen 2021). The current war in Ukraine is one example of this since much of Tunisia’s wheat came from Ukraine before the onset of the war, but now they must import wheat from elsewhere at a higher price (Jamil 2023; Kefi 2023). Tunisia also exports most of its cereals to Europe making the country more and more dependent on providers (Jamil 2023; Knaepen 2021). Food subsidies have been used, on items like bread, to maintain order and keep prices low, but financing issues from the government perspective and the potential IMF deal could cut subsidies which would send food prices skyrocketing (Knaepen 2021; Pavia 2023). In the last several dry years in Tunisia, food stores have been significantly reduced while prices soar (Schwoob and Elloumi 2018). Some scholars even predict that if current environmental conditions persist or worsen, Tunisia may
have to choose whether water supplies go towards maintaining its food security or towards food exports, such as olives and oranges, to earn revenue from abroad (Knaepen 2021). The issue of food scarcity is thus one of the many factors that water scarcity impacts in Tunisia.

Another major area that water scarcity impacts Tunisia is through the economy. While farming accounts for only between 8% and 12% of the GDP of Tunisia, it provides 15-16% of the jobs for Tunisians (Belwaer and Kefi 2023; Chebil et al. 2019; Knaepen 2021). Many rural places rely on farming as the primary source of their income like in the Sidi Bouzid governate in which 40% of the population works in the agricultural sector which is typical across most rural Tunisia (Schwoob and Elloumi 2018; RuMiT 2018; Zuccotti et al. 2018). The olive sector alone provides the primary source of income for 10% of Tunisians from farming to distribution (Knaepen 2021). In Tunisia specifically, scholars have found that scarcity has a negative impact on agricultural markets which spurs on the rising inequality between the interior and the coast (Belwaer and Kefi 2023; Schwoob and Elloumi 2018). Plus, since rural areas are suffering economically, any chance of investment goes solely towards the coast, much as it historically has, further increasing this divide (Schwoob and Elloumi 2018). Farmers also have noticed these changes with 82% saying their financial situation is either deteriorating or in sharp decline in recent years (Réseau Enfants de la Terre 2023). This study goes on to show that 59% of farmers argue that climate change and water scarcity lowers the supply of goods while another 31% claim that it also heightens the demand of goods which drives inflation (Réseau Enfants de la Terre 2023). Economic, social, and environmental worlds are thus found to be impacted by water scarcity tied to agriculture (Chebil et al. 2019).

Taking a deeper look into the economic issue, employment in Tunisia is also negatively impacted by water scarcity and agricultural decline. Chebil et al. (2019) found that less access to
water resources has a negative impact on employment and disproportionately impacts the Southern portion of Tunisia. Schwob and Elloumi (2018) also found that decreases in rainfall impact employment in rural Tunisia especially. Other scholars have noted that water scarcity and climate change impact production and training capabilities in rural areas (Zouabi and Peridy 2015). With farming careers losing money due to water scarcity and prices of essential items like fertilizer increasing, this had led to falling wages for farmers and those who work on farms (Chibani 2022; Jamil 2023; Knaepen 2021). This loss of wages due to water scarcity also has impacted young farmers increasing their disillusionment with the agricultural sector as a whole and has led even to older farmers losing hope about maintaining their farms (Jamil 2023; Knaepen 2021; Schwob and Elloumi 2018). Labor is becoming challenging to find for many because few young people want to stay in rural areas to earn little money leaving the older generation hopeless and without the labor needed to maintain their farms which increases economic uncertainties and exasperates the already dire situation due to water scarcity (Chibani 2022; Jamil 2023). This hopelessness appears to be spreading throughout every region in the country and touches every age group from young to old showing how dire the agricultural system is perceived to be in currently (Jamil 2023).

Thus far, I have demonstrated that water scarcity and water access are significant issues in Tunisia and that these issues impact agriculture which, in turn, impacts food security, the economy, and employment opportunities. Having accomplished this, I now will turn and demonstrate how all of these factors contribute to internal migration in Tunisia. To begin, as the literature review stated, three of the major reasons individuals chose to migrate are to search for better economic situation, employment, or amenities along with the perceptions of their situation and the place they wish to migrate. The first of the reasons which will be examined is the search
for a better economic situation. Water scarcity is estimated to decrease the GDP of Tunisia by 6% by 2050 and this decline will disproportionately impact the interior portions of the country (Chebil et al. 2019; Knaepen 2021). This economic decline has already begun with 82% of farmers saying their financial situation is currently deteriorating or in sharp decline in recent years (Réseau Enfants de la Terre 2023). Research has also found that a reduction in agriculture contributes to an 11% rise in migration (Kefi 2023). In Tunisia, researchers have also shown that having a background in agriculture or livestock increases the chance that a rural family has someone who is an internal migrant (Zuccotti et al. 2018). Since the agricultural economy is on the decline due to water scarcity, and previous literature has shown that many migrants choose to leave to better their economic situation, it should be no surprise that a reduction in agriculture contributes to a rise in internal migration in Tunisia (Chebil et al. 2019; Chibani 2022; Mouri 2023).

Similar to the economic sector, another major cause of internal migration is employment and the search for jobs. Chibani (2022) argues that 64% of Tunisian migrants are looking for work while Zuccotti et al. (2018) argue that most migrants move for work because their income in low at home. In Tunisia, rural areas have faced a lack of growth and unemployment due to developmental disparities between the interior and the coast partially caused by water scarcity in the former (Belwaer and Kefi 2023; Knaepen 2021; Mouri 2023). Other research has shown that unemployment is higher in the interior since water scarcity contributes to unemployment (Schwoob and Elloumi 2018). A decrease in income for farmers from water related scarcity heightens this problem since wages remain low in agricultural sectors making jobs elsewhere look more appealing (Jamil 2023). This is exasperated in rural areas where estimates say that 40% of heads of households derive their income from agricultural and forestry sectors versus
about 15% nationally (RuMiT 2018; Schwoob and Elloumi 2018). And while many studies find that migrants leave Tunisia entirely in search of work, research shows that most international migrants have multiple moves within Tunisia searching for work before moving abroad (Zuccotti et al. 2018). With unemployment higher in agriculture in rural areas, coupled with the reliance of rural areas on agriculture, we can see how unemployment in these areas is at least partially caused by water scarcity. Since broader research has shown that unemployment and job searching contribute to two major reasons for migration, we can see how scarcity contributes to internal migration in Tunisia through unemployment.

The emphasis on job searching is compounded when you examine where migrants choose to go in Tunisia. Chebil et al. (2019) argue that most go from rural to urban areas, which makes sense when considering the regional disparity in investment and industry between the coast and interior (Belwaer and Kefi 2023; Mouri 2023; Schwoob and Elloumi 2018). The last official data kept on internal migration, from 2009-2014 shows that Tunis has the highest rate of internal migration at 13% of its total population while roughly 46,000 people migrated within this period to Tunis alone (Chibani 2022; RuMiT 2018). Most migrants who leave agricultural areas now work in tourism sectors, industry, hospitality, or own small shops, most of which are activities concentrated around the coast and that are favored by the government in terms of water access and that exist due to developmental disparities linked to water scarcity and access (Jamil 2023; Mouri 2023; Schwoob and Elloumi 2018). This migration trend to urban areas also has emptied rural areas with most experiencing a negative migrant balance which outweighs the already negative population growth (Schwoob and Elloumi 2018). Emptying rural areas leads to the overexploitation of water resources in rural areas, since the population continues to grow around cities, which increases the plight of farmers and enhances disparities creating a cyclical pattern.
of water scarcity and access issues which, as we have seen, contributes to internal migration (Mouri 2023; Schwoob and Elloumi 2018).

While economic betterment and employment opportunities make up two of the major reasons for internal migration, the perceptions of what cities mean, and the amenities offered by cities provide another major reason to migrate. Cities are seen as having amenities, like healthcare, education, and services, as well as entertainment which are lacking in rural areas again, due to developmental disparities tied to water scarcity (Belwaer and Kefi 2023; Kefi 2023; Mouri 2023). There is also a perception in Tunisia that individuals raise their social rank if they are able to leave rural areas making cities even more appealing (Belwaer and Kefi 2023). This is coupled with the disillusionment and loss of hope felt by farmers in Tunisia due to water scarcity which decreases profits and harms the quality and quantity of crops which cause farmers of all generations to view farming as a dead-end profession (Jamil 2023; Kefi 2023; Knaepen 2021). The majority of farmers in Tunisia also believe that climate change will impact their children’s right to health, education, water access, and nutrition (Réseau Enfants de la Terre 2023). 81% believe that climate change will impact their children differently based on location and economic status with rural areas faring worse (Réseau Enfants de la Terre 2023). Since healthcare, education, and other amenities are concentrated more heavily in cities and rural areas are impacted more than urban areas by climate change, the desire to move to urban areas to escape climate change and water scarcity and attain basic amenities is present in Tunisia and at least partially impacts individuals’ decisions to migrate.
Discussion of Findings and Limitations

From my research and findings, we can draw three conclusions which pertain to my hypothesis that an increase in water scarcity increases internal migration through the agricultural sector. First, my research has established that water scarcity and water access issues exist in Tunisia. This is due, in part, to climate change which led to a reduction in rainfall, but also due to groundwater salination, bad government policies, which have harmed rural areas, and poor infrastructure. Second, from this, I then established a connection between water scarcity and agriculture. Water scarcity has harmed agricultural markets, decreased agricultural employment, and negatively impacted food security partially because most agriculture and farmers rely on rainfall due to the lack of ability to afford or utilize irrigation. Finally, from this I was able to establish a link between water scarcity, farming, and internal migration. If water scarcity decreases agricultural markets, wages, and employment while job searching, higher wages, and improvement of economic status make up the major reasons for individuals to migrate, then a connection can be drawn between these two concepts. Perceptions also play into this decision with the desire for amenities and an improved life being two major reasons for migration and showing that rural areas lack amenities and that there is a growing disillusionment with farming and fear that climate change will impact farmers’ children disproportionally in rural areas compared to urban areas. With this link established, I believe that these findings generally support my hypothesis.

However, limitations exist in this research which makes supporting this hypothesis difficult. First, without hard data compiled in a scientific manner from all regions in Tunisia and then tested in a linear regression model, it is hard to establish a direct causal link between water scarcity and internal migration. While the evidence examined points to a relationship between
water scarcity and internal migration, without a broader study on migration in Tunisia and interviews with migrants about why they chose to leave, we cannot totally accept my hypothesis. This research was also limited by time constraints, safety concerns, and a language barrier which prohibited a thorough examination of every most of Tunisia outside of the Northern portion of the country which could mean that my research is not applicable to the rest of Tunisia, although I would argue against this since the Northern portion of the country has more rainfall and better access to water than the rest of the country.

For these reasons, I would propose further research to be conducted on this topic in several different ways. First, a thorough examination of the internal migrant situation is needed in Tunisia since the most recent government figures provided date back to 2014. Since then, the COVID-19 pandemic, an economic crisis, a constitutional coup, and a worsening international migration crisis mean that data created in 2014 is far from applicable or reliable for scholars today. Second, I propose an in-depth study into why migrants chose to move in Tunisia with an emphasis on how factors like economic concerns and job searching are tied to unemployment and a worsening economic situation in rural areas caused by climate change. While research has been conducted on why migrants choose to leave, although it comes from almost a decade ago making it mostly out of date, few scholars have examined water as a cross-cutting issue that underlies many of the surface reasons given as the reason individuals chose to migrate. If researchers could, I would urge them to run an analysis on the data collected to see of a causal relationship could be established between water scarcity and internal migration through surface causes such as employment and economic opportunities. Finally, I would urge future scholars to examine migration in Tunisia through a regional lens to examine if regional differences impact internal migration, and, if so, what causes this difference. If these three studies are undertaken, I
believe we could have a better picture of what causes internal migration in Tunisia and how much, if any, impact comes from climate change and water scarcity.
Conclusion

As I hope to have established by this point in this work, the topics of climate change, water scarcity, and internal migration are highly pertinent topics in Tunisia today. With internal, and external immigration on the rise, research must be conducted into the root causes of migration to help diagnose the problem and find potential solutions to it. In this study, I argue that water scarcity is one contributor to internal migration in Tunisia, which my research shows has an impact on internal migration, but not with a causative backing. However, this research is still important because it shows how water cuts across a variety of the reasons that individuals’ list as factors in their decision to migrate. Thus, policymakers may be able to utilize this research in order to create solutions to the water problem impacting Tunisia. While many of these potential solutions are outside the ability of Tunisia to fix, namely the challenge of climate change which is a worldwide issue no singular state can address, there are still some recommendations which could help alleviate at least some of the water scarcity issues plaguing Tunisians.

First, I recommend the government examine the infrastructure system and attempt to repair many of the leaks which account for the loss of at least 30% of drinkable water (Mouri 2023). Next, I would encourage farmers to turn to more drought resistant plants, some of which are indigenous to this area, which would provide some resistance to years of low rainfall. In the coming future, Tunisia will need to address what they value in the agricultural sector, crops they can export or crops that contribute to food security. If they choose the latter, then negotiations will have to happen with the European Union in order to restructure current trade deals which favor export heavy crops and that leave Tunisia in a weak position in which even the crops they export earn little money in return. This would allow Tunisia to focus on their food security while
also increasing profits from the crops they do expert even if the number of exports decreases.

Next, I also would encourage the state of Tunisia to try and attract investment into rural areas of Tunisia. While this will not solve the decades of development disparity between the coast and interior of the country, it will help to create jobs in rural areas and help reduce the need to move to the coast to find work. Also, I would encourage the state to continue working with reuse water, but to find ways to assure the water is clean enough that it can be utilized for agricultural purposes. Finally, I would recommend a push in education across Tunisia to learn how to combat water scarcity at the local level. This will create a new generation of Tunisians that can become innovators that develop solutions to water problems that work for Tunisians and activists that help to push the government to institute these changes and combat the impacts of climate change. I know that these are lofty goals, but I hope, through continued research, interest, and investment, we can slowly ameliorate the ill-effects if climate change and find solutions to water scarcity so that rural Tunisians are not wishing for water while fleeing their farms.
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