Bread, Freedom, and Social Justice:
The Role of Climate Change in the Egyptian Revolution

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I. Introduction

Chants of "Bread, Freedom, and Social Justice" echoed through the streets of Cairo in January of 2011. As the people found courage to take to the streets they demanded bread as they fought for their freedom in a struggle towards democracy in the Middle East. These Egyptians came together to bring down a corrupt government just as their ancestors came to amaze the world with the Great Pyramids. Having established one of the greatest ancient civilizations the world has seen and educating the Islamic scholars who translated and preserved fundamental scientific and philosophical works, Egypt has proven time and time again its resilience and dedication to excellence. It is this same commitment that forced Egyptians to demand justice during the Egyptian Revolution.

Egyptians were no longer coming together to honor their fallen Pharaoh, though. The Egyptian Revolution brought Egyptians together to essentially do the opposite. A number of political, economic, and social issues had been amassing among the Egyptian population for decades under President Hosni Mubarak. Although the economic growth rate was slowing, it remained positive in the year before the revolution.[1] The fact of economic growth in and of itself, though, was not enough to keep Egyptian citizens happy. That is because, despite the growth observed, not every Egyptian was benefitting. Many were being left behind in poverty and unemployment regardless of the fact that they had a university level education. Unfortunately, the government had failed to adequately address growing concerns for affordable housing, job creation, and necessary social services to aid the poor and unemployed.[2] Having been wronged

[1] Mustafa Kamel al-Sayyid. "What Went Wrong with Mubarak's Regime?" in *Egypt's Tahrir Revolution,* eds. Dan Tschirgi, Walid Kazziha, and Sean F. Mcmahon (Boulder: Lynne Rienner Publishers, 2013), 11-26.
[2] Gallup, "Egypt: The Arithmetic of Revolution," accessed March 3, 2017, http://www.gallup.com/poll/157043/egypt-arithmetic-revolution.aspx

and disadvantaged by the decisions and actions of Hosni Mubarak, the people demanded he step down and allow for a more democratic leader to step in and take his place.

However, the Egyptian Revolution represents far more than the domestic battle for democracy. The reasons behind the violent outbreaks and protests shed light on an issue affecting every person, place, and creature on the planet: climate change. This issue is no longer one that can be disregarded as a future issue, one that the inhabitants of this Earth do not have to worry about. The impacts of climate change are wide-ranging and are unfortunately deadly. Today's atmospheric carbon dioxide levels are 405.2 parts per million, which is the highest that CO_2 levels have been in 650,000 years. This drastic increase in a greenhouse gas has had a number of consequences, not limited to increased temperatures. However, it is important to note that the global temperature has risen 1.7º F since 1880 and since 2000 we have observed 9 of the 10 warmest years on record.[3] These consequences have already impacted the world in many ways including an increase in frequency and intensity of severe weather such as droughts, heat waves, and hurricanes.[4] However, the specific effects of climate change in Egypt such as sea level rise and resulting salt-water intrusion played an important role in provoking resource scarcity within the country. This climate related scarcity further exacerbated the social and economic grievances of the Egyptian population making it difficult for citizens to obtain basic needs. This ultimately served as a spark for conflict. While the scope of this thesis is limited to Egypt, it demonstrates a real-world scenario of climate conflict. If the world does not adequately address the issue of climate change, then the situation of climate-related scarcity will be manifested in many other parts of the world. Understanding the importance of the intersection of

[3] NASA, "Global Climate Change: Vital Signs of the Planet," accessed March 19, 2017, https://climate.nasa.gov/.
[4] "NASA, "The Consequences of Climate Change," NASA Global Climate Change, accessed March 19, 2017, https://climate.nasa.gov/effects/.

scientific research and public policy is the single most important issue that this generation has to address in order to prevent further climate conflict in the future.

Unfortunately, not only do climate change deniers exist, but they also hold powerful positions within the United States government, allowing them to sway public policy decisions that impact the rest of the world. Though citizens of developed countries have greatly benefited from the environmental costs of innovation, the people of developing countries stand to face the most devastating consequences for actions they did not commit. If the world's leading countries, such as the United States, can come together to recognize the consequences of anthropogenic climate change, then the world can work to fight the more detrimental impacts. This thesis sets out to accomplish this goal by drawing attention to the fact that violent uprisings are a very real consequence of climate change via a case study of Egypt.

As the hegemon in today's world, it is true that the U.S. plays an important role in setting precedent for policy actions. Unfortunately, Americans live in a divided society and political sphere making environmental policy mobilization difficult. This is no secret and, in fact, a survey conducted by Gallup noted that 77% of Americans considered the United States a divided nation. While the trend over the last 20 years has shown an increasing gap between those who find the U.S. to be divided and those who do not, this is a record high.[5] Coupled with the facts that only 11% of conservative Republicans and 54% of liberal Democrats believe that climate scientists understand the issue of climate change very well, the Earth and its nations face a hostile environment for creating and promoting the necessary policy and attitudes to address

[5] Gallup, "Record-High 77% of Americans Perceive Nation as Divided," accessed December, 6 2016, http://www.gallup.com/poll/197828/record-high-americans-%20perceive-nation-divided.aspx.

climate change.[6] In another Gallup survey on key campaign issues, it was found that the problem of "terrorism and national security" was the top issue among problems in the *above* average in importance to both parties category while climate change was *below* average in importance to both parties.[7] These facts are not promising for dealing with the issue of climate change in the world; however, they demonstrate an opportunity for climate change to be taken more seriously by the public. The best way to do this is to demonstrate how climate change is itself a national security threat.

The securitization of climate change is a change in perspective and a new way in which individual states can recognize the "presumed urgency" of climate change on a political level so that they may act on it to avoid serious consequences.[8] The term securitization is used to identify the environmental issues within Egypt as an existential threat to the livelihoods of Egyptian citizens.[9] As Barry Buzan et al. note, acts of securitization are difficult on a global scale. Attempting to connect the issues identified in scientific research to policy actions of all states in the world is a hefty task; however, focusing on one state at a time proves to be a more reasonable goal. As such, I examine the issues that Egypt has faced to add to a growing narrative that resource scarcity from climate change can lead to violence. The securitization of climate change adds a sense of urgency to the issue and elevates it above others in the political arena. As such,

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[6] Brian Kennedy and Carrie Funk, "Many Americans are skeptical about scientific research on climate and GM foods," December 5, 2016, accessed December 6, 2016, http://www.pewresearch.org/fact-tank/2016/12/05/many-americans-are-skeptical-about-scientific-research-on-climate-and-gm-foods/.

[7] Frank Newport, "Democrats, Republicans Agree on Four Top Issues for Campaign," last modified February 1, 2016, accessed March 21, 2017 http://www.gallup.com/poll/188918/democrats-republicans-agree-four-top-issues-campaign.aspx.

[8] Barry Buzan, Ole Waever, and Jaap de Wilde, "The Environmental Sector," in *Security: A New Framework For Analysis* (Boulder, CO: Lynne Rienner Publishers, Inc., 1998), 71-93.

[9] Ibid.

major world actors such as the U.S. can acknowledge the legitimacy in this argument and work to lead the world towards a more sustainable future.

I focus on Egypt in this thesis because it is an example of a country that stands to lose the most from a situation that it neither contributed to nor benefited from. Egypt never experienced an industrial revolution the way the United States and a number of Western, developed nations did. However, it sits in one of the most vulnerable regions of the world undergoing changes as a result of the carbon dioxide emitted in the air during the development of the Global North. These consequences are documented in scientific journals but the continued damages this country faces have devastating implications for future security. In my paper, I will first discuss how climate change has impacted the world as a whole, and then address the specific consequences to Egypt. Next, I will discuss the prevailing human security theories and the logic connecting human security to violence. Finally, I will present data demonstrating the impact that climate change has had in food and water scarcity in the country. In linking climate changes to perceived threats of human security, it will become clear that the Egyptian revolution was a result of a number of factors aggravated by climate change.

II. Literature Review

My thesis focuses on a particular state that has witnessed drastic changes to its environment and has also witnessed a calculated uprising of its people. In asking what role climate changes played in this conflict, and to what degree these environmental issues did, it is important to first understand how climate change can feed into conflict. A thorough study of the literature in this field answers this question by discussing what security means, how resources play into the definition, and the impact that climate change has in these two subjects. I argue that global climate change impacted Egypt in such a way that it fostered resource scarcity for the citizens of the state thus inciting a sense of human insecurity that triggered civil unrest and protest against the government. In doing so, I analyzed the idea of resource scarcity as the nexus of climate change and security.

Security:

Climate change as an area of study is primarily presented in scientific literature. However, the intersection of climate science and public policy opens up the discussion of climate change and demonstrates the need for science to guide policy. Scholarship in this field has begun to address and analyze the causative relationship between climate science and violence through security. This line of logic is rooted in the idea that the environment is connected to security through a series of causal relationships. As resources become increasingly threatened due to a state's resistance to implement necessary policies, violence among, and within, these states could potentially increase. This threat has transformed the way in which scholars are studying climate change by looking at climate change and its relation to different types of security (i.e. human, national, and collective).

The increase in the potential of conflict stemming from climate change occurs because the security of certain groups is threatened and their ability to survive depends on resources that are becoming increasingly limited. Ultimately, the reduction of available resources in vulnerable regions, such as the North African coast, could lead to two outcomes as outlined by Ragnhild Nordas and Peter Gleick. Either people will immediately begin fighting over the remaining resources or those affected will flee to areas in which they can continue to use necessary resources to maintain a certain standard of living.[10] While option two seems as though it is less violent, it is infeasible for two main reasons. First, we have to recognize that eventually resources will become increasingly scarce and could become entirely unavailable in certain areas of the world. Furthermore, continued non-climate stressors, such as increasing population growth, will only exacerbate this issue of scarcity, affecting everyone. Second, this issue can become more violent because increased refugees in certain areas can incite conflict between the multiple groups of people pushed together into one geographic area. This work presents a solid foundation to the issue of understanding climate change as a security issue and represents a more global view. As Research Director in the Conditions of Violence and Peace Department of the Peace Research Institute Oslo (PRIO) and Senior Researcher and Deputy Editor for the Journal of Peace Research, the credentials of Dr. Nordas legitimize her work as part of the broader subject of climate change and conflict. The existing literature emphasizes the idea that "concrete links" between security and violent outbreaks are not apparent; however, it rests on the fact that there are certain resources that are fundamental to maintaining the livelihood of a state's citizens.[11]

[10] Ragnhild Nordas and Nils Petter Gleditsch, "Climate Change and Conflict," *Political Geogreaphy* 26, no. 6 (2007): 627-638.
[11] Ibid.

The connection between climate change and violence made through issues of security can further be explained by how groups and societies function and coexist. Thomas Homer-Dixon, author of *Environment, Scarcity, and Conflict* and a leading theorist in this field, presents three main types of conflict: simple-scarcity conflicts, group-identity conflicts, and insurgencies.[12] Each of these conflicts is based on the idea discussed above: the world's resources are not entirely renewable and they will run out or be degraded to a point where they can no longer be used in their traditional sense. Consequently, there will be conflict over the resources that remain. This is due to the fact that demand, supply, and access to resources are changing as the world is changing. The available resources on the earth right now are being depleted and degraded, making it more difficult for future generations to use these same resources. This is a function of the "physical vulnerability of the resource" and results in fewer resources to go around and an even smaller "pie" to cut from.[13] Furthering this issue, the world is experiencing population growth in addition to changing consumption behaviors. This means that there is a greater demand for resources and ultimately, each actor will have to get a smaller slice of the pie since there are more actors to share it with.

Lastly, the world is presented with an issue of equity. In keeping with his pie analogy, Homer-Dixon argues that certain groups of people get a larger slice of the pie compared to others in the world. Wealth distribution is not equal around the world and there are many groups in society that are disadvantaged in terms of resources because of their wealth. In discussing natural resources, Homer-Dixon underscores the significance of agriculture to the world's poor, 60-70% of which rely on agriculture for their main income. Unfortunately, while these resources should

[12] Thomas Homer-Dixon, *Environment, Scarcity, and Violence* (Princeton, NJ: Princeton UP, 1999).
[13] Ibid, 57.

be renewable, they are being degraded too quickly and are unable to be renewed as their definition implies. This sort of environmental scarcity, caused by the inability of renewable resources to be renewed, "helps generate chronic, diffuse, subnational violence."[14]

Jon Barnett and W. Neil Adger are two more scholars that contribute to the environmental conflict discourse and present arguments for the relationship between resource scarcity and violent conflict as can be observed in the title of their article "Climate Change, Human Security, and Violent Conflict."[15] Barnett and Adger dedicate a significant portion of their article to recommending future research needs in order to more concretely label climate change as a security problem. However, they argue that climate change limits people's livelihoods by reducing their access to the natural resources they need. They also connect the state to the ability of citizens to maintain their livelihood by arguing that a state can play a role in maintaining human security. It does so by providing citizens with opportunities and services that ultimately help build and maintain peace.[16] Therefore, the capacity of a state to provide safety nets and welfare programs plays a role in helping people satisfy their day-to-day needs. It is this capacity of the state that potentially suppresses conflict. While an individual may not be able to personally support his or her family due to some outside stressor, this person will be less inclined to revolt against the state if the state provides the opportunity for the need to be met.

Climate Change as a Catalyst:

From here, it is logical to lean towards the conclusion that conflict from climate change is fundamentally due to the fact that the consequences from climate change either can get so bad that they can lead to war, or they can serve as the tipping point that pushes countries into

[14] Thomas Homer-Dixon, 53.
[15] Jon Barnett and W. Neil Adger, "Climate Change, Human Security and Violent Conflict," Political Geography 26, no. 6 (2007): 639-655.
[16] Ibid.

conflict. This is the same logic that is observed in a report written by Michael Werz and Laura Conley from the Center for American Progress. Climate change might not be the sole reason for conflict, but it undoubtedly plays a significant role.[17] Certain conditions may exist that create tension, but not necessarily conflict, within a state. The direct repercussions of climate change, as seen through migration pressures or food conflict, eventually pull the trigger for violent conflicts in these situations.

While Homer-Dixon notes that the societal impacts of climate change are expected to be large, they are not "decisively clear." He further argues, though, that climate change will affect societies indirectly by "interacting with other long-present resource pressures."[18] It seems that climate change could then be a catalyst for conflict when other pressures exist in a region. Syria potentially fits this theory and has often dominated the discussion surrounding climate change and conflict. Riddled with corruption and instability, the potential for a civil war in Syria was all there. All that was needed was a match to light the fire. Unsustainable environmental conditions due to climate change, namely the drought in 2008, sparked the conflict.[19]

Peter H. Gleick is a leading scholar in this field with a principle background in science. Dr. Gleick's profile on the Pacific Institute's website, an institute he co-founded and led as president until recently, details how he "developed the first analysis of climate change impacts on water resources, the earliest comprehensive work on water and conflict."[20] This background makes Dr. Gleick a pioneer and one of the most reputable scholars within this discipline. Dr.

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[17] Michael Werz and Laura Conley, *Climate Change, Migration, and Conflict* (Washington, D.C: Center for American Progress, 2012).
[18] Thomas Homer-Dixon, 56.
[19] Peter H. Gleick, "Water, Drought, Climate Change, and Conflict in Syria," *Weather, Climate, and Society* 6, no. 3 (2014): 331-340.
[20] "Staff, Board, and Advisory Council: Dr. Peter H. Gleick," Pacific Institute, accessed December 5, 2016, http://pacinst.org/about-us/staff-and-board/dr-peter-h-gleick/.

Gleick attributes the situation in Syria to climate change by elaborating on the issues of poverty and food insecurity in addition to the "water management decisions, poor planning, and policy errors" that already existed within the state.[21] In the end, climate change was one of the issues that contributed to the conflict in Syria because it directly affected the population by impacting the access to and use of freshwater in a state that was incapable of dealing with such stressors.

Gaps:

While this recent work has shed light on the topic of climate change as a conflict trigger, it is only the beginning. Having set the foundation for this theory in action, there is a need to examine how climate change may have aggravated other countries in the Middle East and North Africa (MENA) region, especially Arab Spring states such as Egypt. Further, as Barnett and Adger discuss the impact on livelihoods, they admit that there is a great need for more research in the area of climate change, human security, and violent actions. They are skeptical about the empirical link between these issues and frame their paper in a way that is meant to guide future research in this area.[22] Similarly, Linke et al. makes the very same point when discussing climate variability and conflicts within Kenya. The authors argue that while many well-known works, such as Hsiang et al., 2013, suggest causal relationships between environmental variability and violent conflict, they do not address more fundamental questions such as *how* and *why* do these relationships exist the way they are observed.[23] This gap is an issue that is discussed in a number of sources that I came across. Articles such as that published by Linke et al. and Tir and Stinnett bridge the gap between social and political contexts and environmental conflict. Tir and Stinnett

[21] Peter H. Gleick, "Water, Drought, Climate Change, and Conflict in Syria."
[22]Jon Barnett and W. Neil Adger, "Climate Change, Human Security and Violent Conflict."
[23]Andrew M. Linke et al., "Rainfall variability and violence in rural Kenya; Investigating the effects of drought and the role of local institutions with survey data," *Global Environmental Damage* 34 (2015): 35-47.

hone in on the impact of international institutions on conflict over water, similar to the logic employed by Barnett and Adger in discussing the importance of the state in maintaining livelihoods.[24] The fact is, in addition to climate change and its impacts on the environment, there is another factor that drives, or possibly controls, conflict.

Though there may be pushback from the academic audience, the patterns remain. There is no definite answer, but it is clear that climate change has the potential to drive conflict in the coming years as states feel the impending consequences of climate change. While they may be able to address issues on a domestic level in terms of updating infrastructure within the state, environmental changes will continue to aggravate the stability of vulnerable regions.

The dialogue regarding food security has evolved and has been addressed by the United Nations Development Programme as a potential threat to conflict. Specifically, the Arab Development: Challenges Report 2011 (revised and published again in 2013) explicitly addresses the idea of climate change as a threat to food and water scarcity in the MENA region. Furthermore, this report echoes the notion that climate change "exacerbates pre-existing social competition over scarce resources and induces new conflicts within society" that is exemplified in the previously discussed works.[25] This study further draws attention to this growing discourse but does not adequately discuss the ways in which climate change impacted the Egyptian Revolution.

In using Egypt as a case study, the specific patterns of climate change impacting human security can be studied as applied to the sense of security and conflict experienced within the

[24]Jaroslav Tir and Douglas M. Stinnett, "Weathering Climate Change: Can Institutions Mitigate International Water Conflict," *Journal of Peace Research* 49.1 (2012): 211-225.
[25] United Nations Development Programme, *Arab Development Challenges Report 2011: Towards the Developmental State in the Arab Region*, (Cairo: Regional Centre for Arab States, 2011).

state. The Center for American Progress recognized the idea of climate change as a potential aggravator in the 2011 Egyptian Revolution in its "Climate and Security Correlations Series."[26] It is here that the concept of climate change as a threat to conflict in this region is legitimized. Troy Sternberg from Oxford University examines the relationship between drought in China and the Egyptian Revolution.[27] This work sets an important precedent for the study of threats to human security as related to wheat within Egypt. Wheat imports are absolutely central to understanding the concepts of food and human security within Egypt. However, Sternberg focuses specifically on climate change impacts in other parts of this world rather than how climate change impacted the physical state of Egypt itself. My thesis expands on the idea that wheat is a driver of food scarcity by addressing the ways in which climate change has impacted Egypt's ability to feed itself and supply food when global prices were impacted.

[26] Caitlin E. Werrell and Francesco Femia, ed. *The Arab Spring and Climate Change,* A Climate and Security Correlations Series (Washington, D.C.: Center for American Progress, 2013).
[27] Troy Sternberg, "Chinese Drought, Wheat, and the Egyptian Uprising: How a Localized Hazard Became Globalized," in *The Arab Spring and Climate Change: A Climate and Security Correlations Series*, ed. Caitlin E. Werrell and Francesco Femia (Washington, D.C.: Center for American Progress, 2013), 7-14.

III. Methodology

Since this thesis is a case study within an inherently cross-disciplinary department, my resources have proven to be unique from one another. Ranging from literary analysis of academic theory to the quantitative analysis of economic data, the research behind this thesis serves a specific purpose of supporting a two-part argument with the most significant factor of my research being the interaction of the results. The first step was finding a link between climate change and food or water shortages and then uncovering the connection between the inability of a state to provide to its citizens and subsequent violent uprisings. Climate change in and of itself is not the sole reason for the political protests observed in Egypt, but the climate change and security link in Egypt is very real. My research thus set out to find the correlation between climate change and violence in the presence of other political, economic, and social stressors.

My research relied on establishing a connection between traditionally scientific studies and theoretical arguments. This overlap exists in the concept of food scarcity as a threat to human security. In noting the physical impacts to the land, the groundwork for the argument that climate change is harming the land so much so that it can no longer provide in a way that is sufficient can be established. As such, I used historical literature to establish the background information on the fertility of the Nile Delta. Furthermore, the actual science behind the changes occurring in Egypt is so fundamental to the consequences the country has actually experienced. As such, I relied on scientific studies examining the impact of climate change in Egypt as well as the overall impact of salt-water intrusion on the agricultural land of the country to establish the basis of this thesis. The studies focused on the rising sea level of the Mediterranean and the increased salinity of the land within the Nile Delta.

From here, I connect these results with their consequences, demonstrating limited access to food and a decreasing ability to grow food on the same level as before. Successfully and adequately building these foundations was reliant on empirical research as well as some content analysis. In regards to the empirical research, this meant taking a quantitative approach and looking at economic data on the importing behavior and domestic agricultural output of Egypt. While prices of staple crops and changes in importing behavior of Egypt are vulnerable to many different kinds of variables, it is still indicative of a changing ability to maintain human security within a state. Therefore, I looked directly to food insecurity data. This quantitative data further allowed me to understand how climate change has contributed to food shortages and deprivation and how this has intensified social conflicts in Egypt.

Understanding the way in which Egypt imports and produces its food, as well as the ways in which Egyptian citizens consume was key to understanding the ways in which climate consequences have further impacted the availability and accessibility of food in the country. To demonstrate this, I started by examining the overall accessibility to food focusing on major patterns and trends over the decades and comparing these to the years preceding the Revolution. However, the general accessibility of food in Egypt is too broad to draw meaningful conclusions from. As such, it became clear that it would be more worthwhile to address the most prominent food: wheat. I learned that wheat is central to the diet of the Egyptians as a food category on its own, and also as feed for more protein rich sources like meat and dairy. I sought out data from the Food and Agriculture Organization of the United Nations (FAO) on food security in general and from there turned to specific reports on the wheat sector of Egypt. Trends in domestic supply, importing behavior, and state storage of wheat all served as important resources from which I was able to conclude the importance of wheat within the country.

After researching the intersection of the climate impacts on the availability of food (i.e. wheat) within the state of Egypt, my methods required applying established theories of food scarcity and conflict to this situation. This meant recognizing and understanding the demands of the Egyptian citizens during the revolution and their connection to climate related scarcity. This is observable in the importing and producing behaviors of the state as well as the connection to issues such as resource scarcity and human security.

IV. A Revolution Born From the Nile

A quick look into Egypt reveals a number of important identifying and distinguishing features critical to understanding how violent uprisings started. Egypt has a population of over 94 million people with a growth rate of 2.5% making it the most populous country in the Arab world.[28] This growing population has the potential to add further stresses to the capacity of the state to provide for its citizens. In the meantime, it relies heavily on the Nile River's resources.

Tahrir Square:

This is when we realized that people are the true power – Ahmed Hassan 2013, "The Square" Protagonist[29]

The image of Mohammad Bouazizi, the Tunisian man who set himself on fire to prove a point to his government, burns in our brains as the literal spark that erupted the series of revolutions that came to be known as the *Arab Spring.* In December of 2010, Bouazizi was so fed up with the injustice and lack of freedom in Tunisia that he sacrificed himself for the strife of his people. After protests erupted, Tunisia's dictator of 23 years, President Zine al-Abidine Ben Ali, gave up his power and fled the country on January 14, 2011.[30] Egyptian citizens, fed up with distaste toward their own dictator Hosni Mubarak, were inspired by the quick success and the ousting of Ben Ali. They took to the streets just 11 days later. As they occupied Tahrir Square, Egyptian citizens of all kinds—Christians and Muslims, men and women, young and old—bonded over a desire to finally have control of their fate. The hope of a new government, a fair government, was within reach.

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[28] "The World Fact Book: Egypt," *CIA*, accessed March 21, 2017, https://www.cia.gov/library/publications/the-world-factbook/geos/eg.html

[29] *The Square*, directed by Jehane Noujaim, featuring Ahmed Hassan and Khalid Abdalla (Noujaim Films, Worldview Entertainment, and Roast Beef Productions, 2013), accessed March 3, 2017, https://www.netflix.com/title/70268449.

[30] Peter J. Schraeder and Hamadi Redissi, "Ben Ali's Fall" *Journal of Democracy* 22, no. 3 (July 2011): 5-19.

It was this hope that kept Egyptian citizens in Tahrir Square day and night. Together, they wanted to not only oust Mubarak, but as *Kite Runner* actor Khalid Abdalla's, father Hossam Abdalla said, they aspired "to establish a true democratic society in Egypt."[31] Though Egyptians suffered a long 30-year dictatorship under Mubarak, this was not the sole purpose of their upheaval. As he struggled to hold back tears, Hossam recalled the undying effort of the Egyptian people to bring forth "one of the great revolutions of mankind." If we recall their chants, Egyptians wanted "Bread, Freedom, and Social Justice" and maintained an enduring stubbornness that spread throughout the population. They called for a "Revolution Until Victory" and bonded with one another as they slept on newspapers in Tahrir awaiting Mubarak's word that he had stepped down. On February 11, 2011 Hosni Mubarak stepped down and the Armed Forces of the country stepped in.[32]

A 30 year dictatorship did not fall within a mere four weeks; rather, Mubarak's Egypt had been declining for years as a huge percentage of the population lived in and remained in poverty. Despite the 5% growth in Egypt's GDP in the year preceding the revolution, only 20% of Egypt's citizens believed that the economic conditions they lived in were getting better.[33] Furthermore, Gallup found that in the months before the revolution, only 9% of all of Egypt's citizens described themselves as "thriving" while the rest of the population identified as "struggling" or "suffering."[34] The figure on the following page illustrates the small percentage of Egyptians who considered themselves as thriving in relation to citizens of other MENA nations.

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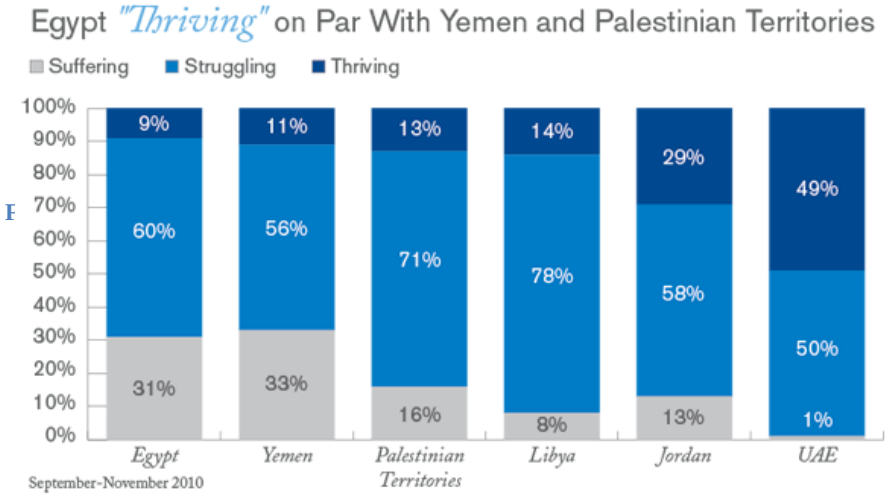
[31] *The Square,* directed by Jehane Noujaim, featuring Ahmed Hassan and Khalid Abdalla
[32] Ibid.
[33] Gallup, "Egypt: The Arithmetic of the Revolution," accessed March 15, 2017, http://www.gallup.com/poll/157043/egypt-arithmetic-revolution.aspx.
[34] Ibid.

This fact highlights the level of inequality felt among Egyptian citizens just prior to the revolution.



Egyptians Suffering, Struggling, or Thriving[35]

These citizens were unable to access basic services to maintain their livelihoods and much of the educated youth remained unemployed.[36] The very calculated uprising and commitment of the Egyptian people forced the President to step down; however, it did not solve the problems the country still faced. Unfortunately, democracy did not take hold in Egypt or any other Arab Spring state aside from Tunisia. Efforts to bring forth a renewed freedom and a government for and by the people were squashed when the Armed Forces took over and later when the Muslim Brotherhood and other Islamist parties won the majority of the seats in the first Parliamentary elections since the overthrow of Mubarak.[37]

[35] Gallup, "Egypt: The Arithmetic of the Revolution."
[36] Lisa Anderson, "Demystifying the Arab Spring," *Foreign Affairs*, May/June 2011, accessed March 1, 2017, https://www.foreignaffairs.com/articles/libya/2011-04-03/demystifying-arab-spring.
[37] Jasmine Coleman, "Egypt election results show firm win for Islamists," *Guardian*, January 21, 2012, accessed March 1, 2017, https://www.theguardian.com/world/2012/jan/21/egypt-election-clear-islamist-victory.

Just two years after this, Mohomed Morsi, the first democratically elected leader in Egypt was removed by Egypt's military officials.[38] Six years later, Egypt is worse off than it was under Mubarak. President Abdel Fattah el-Sisi came to power promising to care for the Egyptian people; yet, 28% of the population lives below the poverty level and 13% are unemployed.[39]

While it is important to acknowledge the conditions within the state of Egypt today, we should focus on the causes of the Egyptian Revolution of 2011 in order to evaluate the role of climate change in these instances of violent uprisings. Citizens protested the corrupt government and demanded change so that they could stop living in a state of poverty and injustice. There are a number of clear political, social, and economic factors that played significant roles in this; however, the role of climate change as a conflict trigger in relation to the existing issues still needs to be analyzed.

The Nile:

The idea that water is life is embodied in the existence of Egypt and the story of its interconnectedness to civilization has been known for millennia. The Nile River flows North through the Sahara desert fostering life and establishing the basis for one of the world's greatest ancient civilizations. The natural movement and changes of the Nile clearly demonstrate the ways in which ancient and modern Egyptians used this river to establish functional and prosperous societies. As it approaches the Mediterranean Sea, the Nile splits in two. The Rosetta Branch and the Damietta Branch carry the Nile to the coast and form the 8,500 square mile delta between them, watered by a number of smaller channels. Today's Nile Valley and the resulting

[38] David D. Kirkpatrick, "Army Ousts Egypt's President; Morsi Is Taken Into Military Custody," *New York Times,* July 3, 2013, accessed March 1, 2017, http://www.nytimes.com/2013/07/04/world/middleeast/egypt.html.
[39] UNDP, "About Egypt," accessed March 23, 2017, http://www.eg.undp.org/content/egypt/en/home/countryinfo.html.

delta is the byproduct of eight thousand years of Ethiopian silt deposition as the river flowed northward. Though the combined gravel, sand, and silt (known collectively as alluvium) left behind was simply mud, long exposure to the sun transformed it into soil and then nutrient rich and fertile earth. The silt deposited as the Nile flowed is what has allowed for civilizations of all kinds to prosper in the region.[40]

The flooding behavior of the Nile further allowed for the physical settlement of Egyptians. During its annual flood, the river would overflow the banks while leaving behind the heavier sediments that it carried. Consequently, the river left behind walls that reached ten feet tall on both sides of the river allowing for Egyptians to stay dry from the flooding but have easy access to the fertile soil of the low-lying basins bellow. Though the changing flow of the Nile proved to be a constant challenge for both ancient and modern Egyptians that prevented permanent settlement on these embankments, the so-called "wanderings" of the river served to shift the main channel from west to east and resulted in the great city of Cairo. That is because the movement of the river left the fertile land on which Egyptians could expand and prosper within thus establishing Cairo. Political gains within the Islamic Empire led by the Fatimid general Jawhar further aided in the growth of the Egyptian civilization in the tenth century. In the many centuries to come, other leaders such as colonial leader Sir Colin Scott-Moncrieff, also exerted their influence in the city and the region thriving on the natural resources the river had to offer.[41]

The Nile River of today embodies the changes in climate that the Earth has observed over thousands of years and the political decisions made under the leadership of Islamic rulers and

[40] Robert O. Collins, "The Egyptian Nile and Its Delta," in *The Nile* (New Haven: Yale University Press, 2002), 122-40.
[41] Ibid.

generals from colonial powers. To understand how climate change has impacted the Nile and its delta in modern times, it is important to note the natural changes that occurred as time progressed. Eventually, the roaring flow of the river gently slowed and had the power to carry only mud instead of coarser sand and gravel. Here, the idea of the Nile's developments fostering life is once again displayed. This mud remained within the delta due to the strong base that had been left behind by the stronger current of the Nile that carried coarse sand and gravel allowing for cultivation and agricultural development.[42]

While it is true that climatic changes were dealt with naturally or through political decisions, it is also true that these changes hurt the Delta and presented challenges to the inhabitants in the past. In fact, desertification forced the ancient Egyptians inwards towards the fertile land of the Nile Valley and its delta. As food and water became more and more scarce, the hunters and gatherers that had prospered from the great rains of the Nubian Wet Phase were pushed to the banks of the Nile where water and food were more abundant.[43] It is here that the first scenario of food scarcity leading to increased violence within the state of Egypt is suggested. As the population surrounding the fertile land of the Nile's banks increased, there was greater competition for the resources that ensured survival. Cracked skulls and bones found in the cemeteries from these times could be a byproduct of people fighting one another for access to land for food cultivation.[44]

Furthermore, the crops that were cultivated at this time when civilization prospered from the natural fertility of the Nile, such as wheat and other cereal grains, are still grown today. Since then, the issue of desertification has remained and Egyptians face new, harsher conditions

[42] Collins, *The Nile.*
[43] Ibid.
[44] Ibid.

stemming from climate change and population growth. One such condition is limited land availability, which is directly related to the rising sea level of the Mediterranean on Egypt's Northern coast.

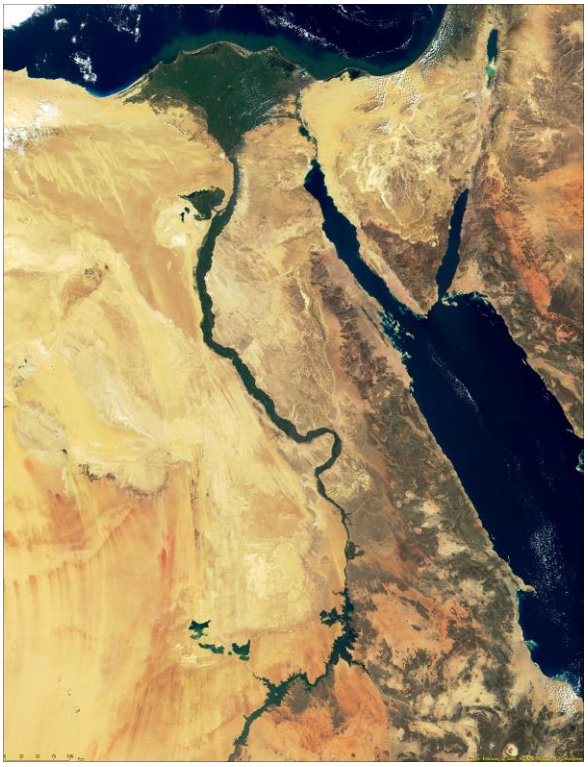
It is important to recognize the fact that the delta and its fertility are not only dependent on the river itself, but also on the Mediterranean Sea that the river leads to. The deposition of the incredibly fertile and nutrient rich soil by the river is influenced by the rising and falling sea level of the Mediterranean. In fact, the changes in sea level essentially regulated the fertility of the delta. Fifteen thousand years ago, before the glacial ice began retreating, the Mediterranean Sea was four hundred feet below today's sea level. As global temperatures continued to climb throughout the millennia, the Mediterranean Sea rose accordingly. Only at one point did the sea level fall to match a time of global cooling. However, as temperatures continued to increase, the rise of the Mediterranean has remained steady. This rise in sea level overwhelmed the shoreline with saltwater that combated the fertility of the delta to a point in which the northern coast of the delta was incapable of agricultural production.[45]

Changes in irrigation and production techniques have taken shape throughout the development of the region and the modern state of Egypt. Now, Egypt is the most populous country in the entire Arab world with a climbing population now at 94 million. As such, there are not only stressors on the fertility and cultivability of the land due to climate change and sea level rise, but also from the population growth the country is experiencing.

The Nile River meant life for ancient Egyptians because of the freshwater that flowed through the desert and the fertile land it left behind and the same is true for modern Egyptians. The river itself not only provides water for drinking but it also supports food production. Egypt

[45] Collins, *The Nile.*

is reliant on the Nile for 94% of its total water resources and 97% of its renewable water resources.[46] Over 60% of food production in Egypt comes from the Nile Delta. The Delta further physically supports the population. Though the Nile Valley and the Delta comprise only 4% of Egypt's land, 97% of the Egyptian population lives here. The other 96% of Egypt is inhospitable desert land.[47] The figure below is a satellite image showing the stark contrast of desert land and the fertile delta. Therefore, considering the increased population Egypt awaits, there will not only be greater population density, but also increased demand on diminishing resources.



Satellite Image: Egypt[48]

[46] Wouter Wolters et al., ed. Marc A. Rosen, "Issues and Challenges in Spatial and Temporal Water Allocation in the Nile Delta," *MDPI Sustainability* 8, no.4 (April 2016).
[47] Jack Shenker, "Nile Delta: 'We are going underwater. The sea will conquer our lands,'" *Guardian*, accessed March 21, 2017, https://www.theguardian.com/environment/2009/aug/21/climate-change-nile-flooding-farming.
[48] Jacques Descloitres, *Egypt, Nile Delta And Sinai From Modis*, 2000, image, NASA, accessed March 3, 2017, https://visibleearth.nasa.gov/view.php?id=54842.

The protection of the Nile Delta is absolutely crucial to the survival of Egypt and its ability to support the growing population. Egypt's location in relation to the Mediterranean Sea makes it extremely susceptible to sea level rise. As has been proven in the past, the rising level of the Mediterranean Sea impacted the total land area available for agricultural production. Since then, population has increased significantly, accompanied by the increased amount of pollution and degradation of economic development. These changes will only worsen as the population of Egypt climbs to 100 million and beyond. For this reason, it is fundamental that every state in the world, and especially global powers, understand the concrete facts associated with global climate change and the undeniable role that humans have played in its progression. Egypt and its Nile Delta are just part of the bigger picture; but, it is fundamental that the environmental changes to the Delta are understood in conjunction with the social and political unrest witnessed in the country.

V. Climate Change

Climate change is inherently a global issue. There are not borders in the atmosphere and no way to limit the effects of pollution to the country that is responsible for them. As such, the nature of climate change in the broadest perspective is integral in understanding the specific effects of this global phenomena on Egypt in particular. I will begin by outlining the basic facts of climate change as a primer to the environmental issues in Egypt as a result.

***Globally*:**

Following the end of the 21st Conference on the Parties (COP21) from the United Nations Framework Convention on Climate Change (UNFCCC) came the election of Donald J. Trump, clearly signaling an uphill battle for bringing the issue of climate change onto both national and international stages. One thing remains true, though: anthropogenic climate change is real. In the Synthesis Report of the Intergovernmental Panel on Climate Change's Fourth Assessment Report in 2007, the scientists agreed that the warming of the planet is "unequivocal."[49] There is no debate about whether or not our climate is actually warming, despite doubt existing in its causes. However, this debate is merely the projected illusion of those with a vested interest in denying the human relationship to climate change.

The facts of climate change have been studied extensively and the effects compiled in thousands of reports. The IPCC stands out in this particular field because of the sheer number of scientists from multiple backgrounds that came together to document the impacts of global climate change. In addition to the Fourth Report mentioned above, the IPCC published its Fifth Assessment Report in 2014 with many of the same basic facts about global climate change. The

[49] Core Writing Team, R.K Pachauri, and A. Reisinger, eds., *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva, Switzerland: IPCC, 2007).

temperatures during the last three decades have been higher than any preceding decade since 1850. Consequently, there have been numerous environmental changes observed since the 1950s that are alarming for a number of reasons and are unprecedented over decades to millennia.[50] These changes include the warming of both the atmosphere and the ocean, a reduction in the amount of snow and ice on land, and a rise in sea level.

At this point, we understand that the global climate is warming. Moreover, we also know that carbon dioxide levels in the atmosphere have increased and are continuing to increase due to the burning of fossil fuels. Understanding the science behind these facts plays a role beyond just padding our background knowledge on the issue. It is a necessary step to accepting the fact that humans are the root cause of the issue and fundamental towards solving the problem. To answer the question of whether climate change is anthropogenic or due to natural processes like volcanic activity and solar irradiance, it is important to understand the greenhouse effect. In our solar system, Earth is the only planet we know of that can support and foster life. This is due to many factors and in part, to our atmosphere. The Earth's atmosphere is composed of many gases: water vapor, carbon dioxide (CO_2), methane, and nitrous oxide. The gases act as blanket around the Earth and allow rays from the sun to enter the atmosphere. The greenhouse gases help to absorb the sunlight and warm the Earth and then radiate it back to space. The greenhouse effect in and of itself is not detrimental; in fact, it is the process in which the Earth reaches the proper temperature that fosters life on Earth.

The problem arises when there is too much of any or all of these gases. That is because these gases block the heat from escaping and we are left with a runaway greenhouse effect much

[50] Core Writing Team, R.K. Pachauri and L.A. Meyer eds., *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva, Switzerland: IPCC, 2014).

like that seen on Venus. Since there is an overwhelming amount of carbon dioxide, the temperature on Venus is extremely hot. This is where we begin to see a causation argument coming in. Since carbon dioxide is a greenhouse gas that contributes to the greenhouse effect, then increasing the amount of carbon dioxide in our atmosphere will increase the greenhouse effect because more heat will be trapped on Earth causing temperatures to rise. Ultimately, the increase of the Earth's temperature and other climate changes will lead to dramatic changes on Earth that will alter life as we know it.

These changes have been occurring worldwide for decades now at the hands of mankind and they stem beyond increased greenhouse gases in the environment and a warmer climate. The impacts of rising sea levels in addition to increased extreme weather patterns will wreak havoc on those unable to protect themselves from these impacts. This largely includes "smallholder" and "subsistence" farmers. Climate change will impact these people the most because they are largely located in the tropics where they not only feel dramatic effects of climate change but also have a limited capacity to adapt to such change. The trouble with smallholder and subsistence farmers is that the actual impacts of climate change will be hard to predict and "small farm sizes, low technology, low capitalization, and diverse nonclimate stressors" all contribute to the increased vulnerability.[51] The increased frequency of major climate related events in developing countries that target the rural poor requires an attempt to truly build the capacity of the poor to adapt and learn about the effects of climate change on their crops and livestock. The rest of the world, developed and undeveloped also faces a growing need to adapt to climate change in order to maintain the ability to feed our growing population.

[51] John F. Morton, "Small Farm Sizes, Low Technology, Low Capitalization, And Diverse Nonclimate Stressors," *Proceedings of the National Academy of Sciences of the United States of America* 104, no. 50 (December 2007): 19680-19685.

In Egypt:

While it is true that every person and place will experience some effect of climate change, Egypt is particularly vulnerable to sea level rise. A study found in the journal *Nature Climate Change* warns of Alexandria's high vulnerability to flooding, identifying it as one of the leading cities with the greatest increase in risk of flooding come 2050.[52] This flooding experienced by the coastal city of Egypt is a direct result of climate change via sea level rise (SLR). As carbon dioxide continues to pollute the atmosphere, the oceans are warming. Consequently the water is expanding and glaciers are melting. Therefore, not only is more water being added into the oceans, but also the water is expanding due to its increase in temperature collectively increasing the sea level.[53] This explains the reason why the Nile Delta is among the top areas on the planet most vulnerable to SLR. In fact, the Nile Delta along the Mediterranean Sea is projected to suffer from SLR of 1m within the next century.[54] This flooding expected to impact coastal cities such as Alexandria and Port Said in the years to come is just one example of the consequences Egypt will face as a result of this SLR. However, this cannot be taken lightly as all of the consequences are significant and will not only influence population displacement, but also availability of food.

The agricultural sector will suffer and the already diminishing water supply will be further affected. SLR will lead to intense salt-water intrusion destroying the fertility of the Nile

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[52] Tran Viet Duc, "Which Coastal Cities Are at Highest Risk of Damaging Floods? New Study Crunches the Numbers," World Bank, August 19, 2013, accessed December 1, 2016, http://www.worldbank.org/en/news/feature/2013/08/19/coastal-cities-at-highest-risk-floods.
[53] "Sea Level," *NASA*, accessed December 1, 2016, https://climate.nasa.gov/vital-signs/sea-level/.
[54] Mervat M. Refaat and Yasser Eldeberky, "Assessment of Coastal Inundation due to Sea- Level Rise along the Mediterranean Coast of Egypt," *Marine Geodesy* 39, nos. 3-4 (May 2013): 290-304.

Delta and reducing crop yields. The UNDP also warns that 3.3% of the Nile Delta's total land area will be lost to rising sea levels.[55] While this may seem like an insignificant portion of Egypt's total land it is important to recall the fact that 96% of the population lives on this land. Not only this, but this loss of land in the Nile Delta also translates into a submersion of approximately 16 km^2 of valuable currently cultivated land, directly impacting Egypt's ability to grow food and provide an income for those reliant on the land for said income.[56] It should further be noted that the nearly 63% of Egypt's agricultural land is accounted for by the Nile Delta.[57] This demonstrates the fact that SLR along the Mediterranean Coast will not simply submerge land that Egyptian citizens live on, but it will directly reduce the land on which the state relies on for a majority of its domestic agricultural production.

The Nile's waters have always played a huge role in maintaining the fertility of the land and washing away the salinity in the soil from the rising sea level through the annual flooding of the river. However, after the construction of the Aswan Dam in the 1970s, this flooding ended. This meant that the salt that permeated the soil as the sea level rose remained in the soil. This caused the soil to dry out resulting in a diminished natural fertility. As such, farmers have had to rely on more and more fertilizers. Local farmers have had to put up to 80% of their profits aside for the sole purpose of paying for chemicals necessary to grow food on their land.[58] It is important to note that climate change is an underlying reason for the reduction in freshwater in

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[55] UNDP, *Project Document 3748: Adaptation to Climate Change in the Nile Delta through Integrated Coastal Zone Management*, Ministry of Water Resources and Irrigation, Coastal Research Institute, the Egyptian Shore Protection Authority, 2009, accessed December 1, 2016, http://www.undp.org/content/dam/egypt/docs/Environment%20and%20Energy/Climate%20Change%20Project%20Document.pdf

[56] Ibid.

[57] Mervat M. Refaat and Yasser Eldeberky, "Assessment of Coastal Inundation due to Sea- Level Rise along the Mediterranean Coast of Egypt."

[58] Jack Shenker, "Nile Delta: 'We are going underwater. The sea will conquer our lands'."

the country, which is why the High Dam as Aswan was built in the first place. This then resulted in the reduced fertility of the land impacting the agricultural sector of Egypt. Ultimately, local farmers have to spend more and more of their profits to ensure that food will even grow on their land, something that had been a given for farmers in the decades before.

VI. Conflict Understood Through Security

Security:

In order to more fully comprehend the argument relating climate change to violence, we can separate "security" into three main categories.[59] On the most fundamental level, there is *human security*, which is security on a personal level, such as access to available resources needed to maintain the livelihoods of a state's citizens. When individuals share the same basic needs for survival, their ideas and needs are grouped together as *national security*. This level of security goes beyond that of the state's individual citizens and represents the state as a whole. National security also includes the geopolitical and economic goals of the state. Finally, when the world comes together and expresses security needs as affecting each and every state in the same manner, the idea of *collective security* is demonstrated.[60] With this in mind, the idea that climate change has become and will continually be considered a national security threat becomes clear. This is because the concept of national security is dependent on human security. When the majority of a state's population identifies their issues in a similar manner, they ultimately share the same basic need for survival, as discussed above.

Human security as defined by Barnett and Adger is "the condition where people and communities have the capacity to manage stresses to their needs, rights, and values."[61] It is important to note that this definition of human security truly goes above and beyond basic resources. One can have food, water, and shelter, but if one lacks rights like freedom, then one exists in a state of human *in*security. As such, the idea that the state provides human security to its citizens cannot be denied. Whether protected by a constitution or not, a state maintains certain

[59] David Zierler, "Consequences: Security and War" (lecture, Boulder, June 19, 2015).
[60] Ibid.
[61] Jon Barnett and W. Neil Adger, "Climate Change, Human Security and Violent Conflict."

rights and values for its citizens. The fact of the matter is that these will not be the same across the board. The coexistence of democratic states like the United States and authoritarian regimes like Egypt creates world in which citizens can easily compare what they do and do not have. Therefore, there is a delicate balance that should be maintained by the capacity of the state. Not having true democratic freedom observed in other countries is an infringement on human security. However, when faced with the possibility of going hungry, humans are more directly impacted on a survival basis. This is especially the case when the state cannot step up to help its citizens feed themselves.

In this context, it should be noted that climate change alone cannot establish a state severely lacking in human security. This is dependent on the institutions within the state and its ability to maintain human security on a basic level and support citizens at times when it is threatened. This could be anything from a democratic political system that listens to the voice of the people in the country to a welfare program that supports the state's poor and generally maintains a standard of living across the board. However, if a state is incapable of protecting its citizens' rights and needs, it creates an environment of insecurity fostering feelings of anger and fear within the population.[62]

Acknowledging that a state plays a role in the level of human security that its citizens feel, it is also important to consider the consequences that may come forward as a result. One such consequence is the relation of human security to national security. If just a handful of citizens feel as though their rights and needs are not met, the security threat ends with them. However, if enough citizens share the same concerns regarding the maintenance of their livelihood, a threat to national security is born.

[62] Jon Barnett and W. Neil Adger, "Climate Change, Human Security and Violent Conflict."

The Intersection of Climate Change and Human Security in Egypt:

While the link between human security and national security is relatively clear, it would be beneficial to clarify the connection between climate change and human security. The concept of security is threatened by climate change because of the fact that survival needs are based on access to resources from the Earth, i.e. food and water. If and when these are limited, it follows that violence will ensue because each person, and collectively each state, needs these resources to maintain a sense of livelihood and therefore notions of both human and national security.

This violence essentially progresses into either interstate conflict or intrastate conflict. Conflict between states could happen because one state has the natural resources to support its population. This state is the direct reason that the other states do not have access to limited natural resources. In the context of the Nile River, access and availability of its water could be a potential trigger for conflict between Egypt, Sudan, and Ethiopia. Based on the fundamental need to survive, these states will continually be pitted against each other in order to have access to limited resources of the river.

Intrastate conflict, on the other hand, is a byproduct of a number of factors that are exacerbated by climate change. The scenario of fear and anger stirred up among citizens when basic needs cannot be met is the exact situation observed in Egypt when prices of food increased in the years prior to the revolution. Citizens facing a dictatorship that left them economically disadvantaged also faced a restricted ability to afford the most basic, cheapest, staple food item. Every aspect of human security was threatened within Egypt: bread, freedom, and social justice.

Egypt's ability to provide an adequate level of food security to its citizens was impacted by a number of factors, though, including climate change consequences. This includes the fact that Egypt is the world's largest importer of wheat in the world and relies on the Nile for most of its water. Climate change worsened the country's ability to be agriculturally self-sustainable, or

at least provide that which it cannot solely import, because of its direct impacts on the soil and water supply of the region. Examining the relationship between climate change's SLR and the agricultural capabilities of Egypt is central to understanding the link to human security and violence. Climate change has a very strong but indirect link with conflict here. The impacts of climate change on agriculture go further than just the visual effects seen on the surface, such as the crackling of the land where the soil should be fertile. While farmers stand to lose their crops and people are going hungry, there are other consequences in terms of violence that we simply cannot ignore.

This impact of climate change on the agricultural sector of Egypt is directly related to human security in the country. That is because the agricultural sector is not only a source of food for the country, but it is also a source of income for those who cultivate the land. A decrease in the agricultural output therefore directly weakens the ability of citizens of the country to sustain themselves and their families.

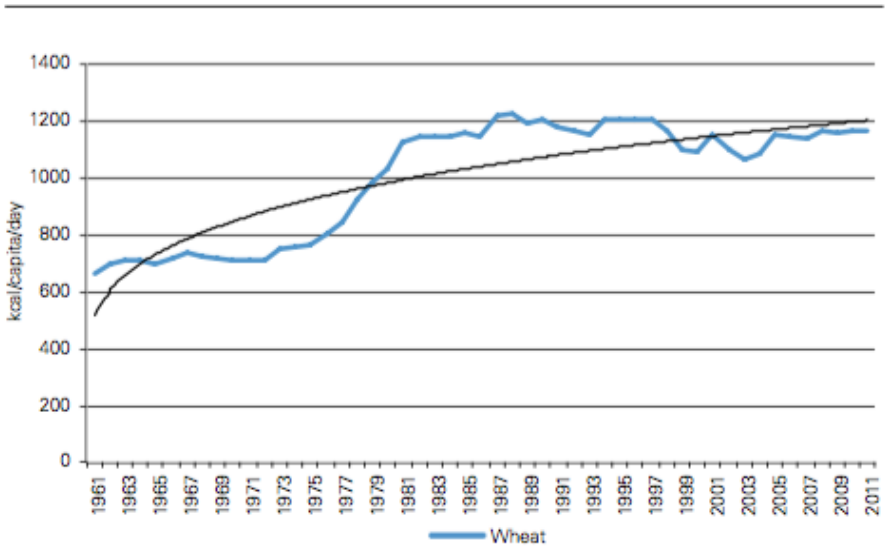
The Arab Spring wreaked havoc on the Middle East and one of the triggers for the massive uprising in Egypt was the increased cost of food- specifically bread. It is what sustains Egypt and much of the Arab world. When food prices spiked in 2007-2008, it fueled a fire that was already burning. Considering the increasing unemployment and social unrest in conjunction with the loss of subsidized bread and intolerable increases in food prices, this is the perfect example of how climate change is a threat multiplier. This means that climate change itself is not the sole reason for conflict, but rather it serves to exacerbate existing issues. And for this, we can regard at least part of the Arab Spring as a climate conflict.

VII. Food

As previously established, the agricultural sector of Egypt is particularly vulnerable to climate change related impacts such as sea level rise. The loss of such limited cultivable land signals an oncoming threat to the staple domestic crops of Egypt. This is further exacerbated by Egypt's strong dependence on a single crop.

Egypt:

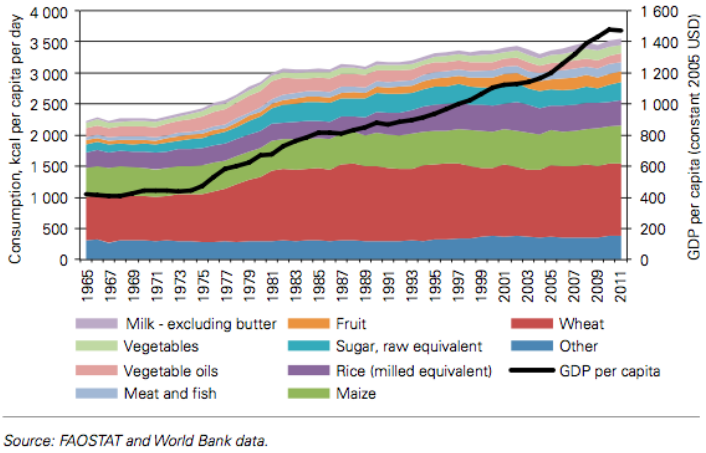
Bread and wheat are central to the vitality of the Egyptian people. Wheat as a cereal grain is the main source of energy in terms of caloric intake in Egypt. This trend has been prevalent within Egypt for decades. Despite an increase in wheat consumption between 1960 and 1990, consumption levels remain relatively stable today and account for nearly one third of the Egyptian's daily caloric intake. Over a fifty-year period spanning 1961 to 2011, the consumption of cereals within Egypt increased six-fold with nearly 50% of the consumption accounted for by wheat in 2011.[63]



Daily per capita energy intake from wheat in Egypt 1960-2011[64]

[63] Julian McGill, Dmitry Prikhodko, Boris Sterk, and Peter Talks, *Egypt Wheat Sector Review* (FAO Investment Center, 2015), accessed http://www.fao.org/3/a-i4898e.pdf.
[64] Ibid.

At the same time, it is important to observe that while wheat remains relatively stable, other fat and protein rich food sources are available within Egypt. This demonstrates how the dependence on wheat within this country does not stem from an idea that it is the only food source available to the people. While Egyptians consume more wheat than anything else, there are still options for them within the state. In the figure below it is clear that the caloric intake of Egyptian citizens is not just from wheat, however, daily caloric intake is mainly accounted for by the cereal.



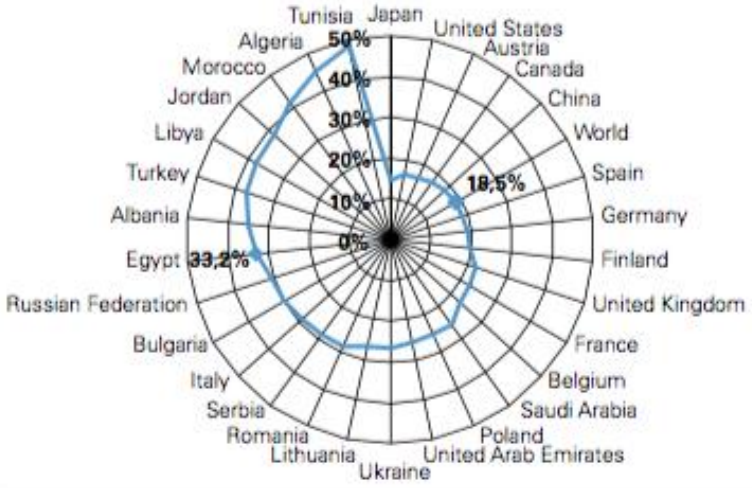
Daily caloric intake from food products and GDP growth[65]

Furthermore, even if these other food sources experienced an increased demand within the country, this would imply repercussions in the wheat sector. This is because animals require feed, typically wheat. Thus, while the availability of meat increases, so does the demand for wheat as feed. In fact, animal consumption of wheat is increasing significantly compared to that of other cereal grains used as feed for animals. In the five years preceding the Revolution in 2011, demand for wheat as feed increased by 159% while demand for other grains barely increased 12%.[66] The demand for wheat echoes through the entire food pyramid within Egypt. This fact represents another avenue through which the demand of wheat in Egypt impacts food

[65] Julian McGill, Dmitry Prikhodko, Boris Sterk, and Peter Talks, *Egypt Wheat Sector Review*.
[66] Ibid.

and human security. So, if Egyptians were to shift their consumption habits, and thus the food source ratios in their daily caloric intake, towards a more protein rich diet, the issue of increasing wheat prices would still be felt through these changes.

The dependency on wheat of the Egyptian population is not unique to this country. Many MENA countries are highly dependent on wheat and bread despite their GDP level. A higher income level is typically indicative of more protein-based diets. However, countries in this category such as Egypt, Tunisia, and Morocco are among the highest in total global wheat consumption.[67] This dependency is intriguing since their diets should be more diversified since they can technically afford more protein rich food sources based on the country's GDP. However, it also raises a number of questions regarding its origin and its implications.



2009-2011 average wheat share in total consumption by country[68]

One of Egypt's more unique features in regards to wheat is the sheer number of subsidies placed along the production line for bread. From the very beginning of the process, the Egyptian government subsidizes the fertilizers used to grow the wheat in the country itself. From here, the actual price of the wheat grown is subsidized, and finally, the actual product in the form of

[67] Julian McGill, Dmitry Prikhodko, Boris Sterk, and Peter Talks, *Egypt Wheat Sector Review*.
[68] Ibid.

baladi bread is subsidized. The Egyptian government places a significant amount of importance on making bread available to its people.[69] However, while these subsidies make this food source more widely available to the Egyptian population, it intensifies the abnormal dependence on wheat. Nonetheless, this dependence exists and is a critical component of understanding the problems and needs of the Egyptian people.

Price Hikes:

In 2008, the OECD outlined the causes and impacts of the global hike in food prices. The organization introduced the idea of climate change as a factor in the supply shortages contributing to the price hikes.[70] In considering this, it is important to understand the relationship between the impacts of climate change and the changes observed in the agricultural sector, specifically in Egypt.

The World Bank and FAO argue that Egypt is among the most vulnerable to a sustained food price shock as a result of the 2011 fiscal balances and the wheat import data from the previous year. Here, it becomes clearer that the country was already disadvantaged from the beginning and that climate change serves as an aggravator and is not the sole trigger.[71] Global food prices experienced an increase worldwide, especially the price of cereal grains including wheat. The wheat price shocks observed in 2007/8 and 2010/11 are concerning for a number of reasons including the fact that they signal a potential increase in volatility of wheat prices[72]. In the short term, however, this price increase on Egypt's staple food is concerning because it

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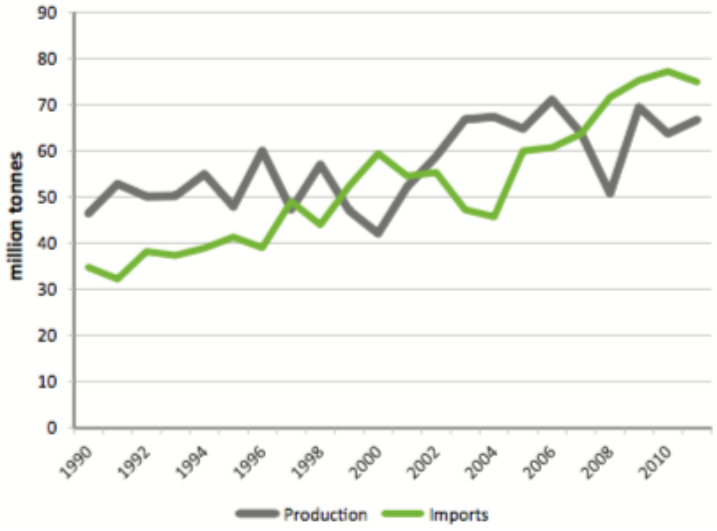
[69] Oday Kamal, *Half-Baked, The Other Side Of Egypt's Baladi Bread Subsidy: A Study Of The Market Intermediaries And Middlemen In The System* (Barcelona: CIDOB, 2015).
[70] OECD, *Rising Food Prices: Causes And Consequences* (OECD, 2008) accessed http://www.oecd.org/trade/agricultural-trade/40847088.pdf.
[71] World Bank and FAO, *The Grain Chain: Food Security and Managing Wheat Imports in Arab Countries* (Washington D.C.: World Bank, 2012).
[72] World Bank and FAO, *The Grain Chain.*

threatens the idea of human security via food. Looking back to Barnett and Adger's definition of human security, food can be included under the idea of "needs". Therefore, when the price of wheat goes up and a country is no longer able to provide subsidies, citizens' ability to obtain their own needs is diminished, as is the overall sense of national security.

This fact coupled with the dependency observed within MENA nations, particularly Egypt, is of growing concern and the dependency is expected to increase. One of the biggest challenges that Egypt could face as a result of this is the fact that the as the price of wheat increases globally, the costs will be too high for the population to afford even though the wheat supply may be abundant. On the other hand, the possibility also exists that the population will have the financial means to purchase food but the supply will not be sufficient. The World Bank identifies these two issues as separate risks threatening separate food security aspects: availability and accessibility.[73] As such, it is important to understand that both have an impact on the potential volatility and revolution in the country.

One way to explore how the idea that availability and accessibility might be connected is by looking at the reason for price hikes, both in terms of domestic growing behaviors and import availability. In general, the MENA region has observed an increasing trade deficit in regards to its cereal production beginning in the early 2000s. The figure on the following page graphically shows that the region has begun to rely on imports more than domestic production for access to cereal grains.

[73] World Bank and FAO, *The Grain Chain.*

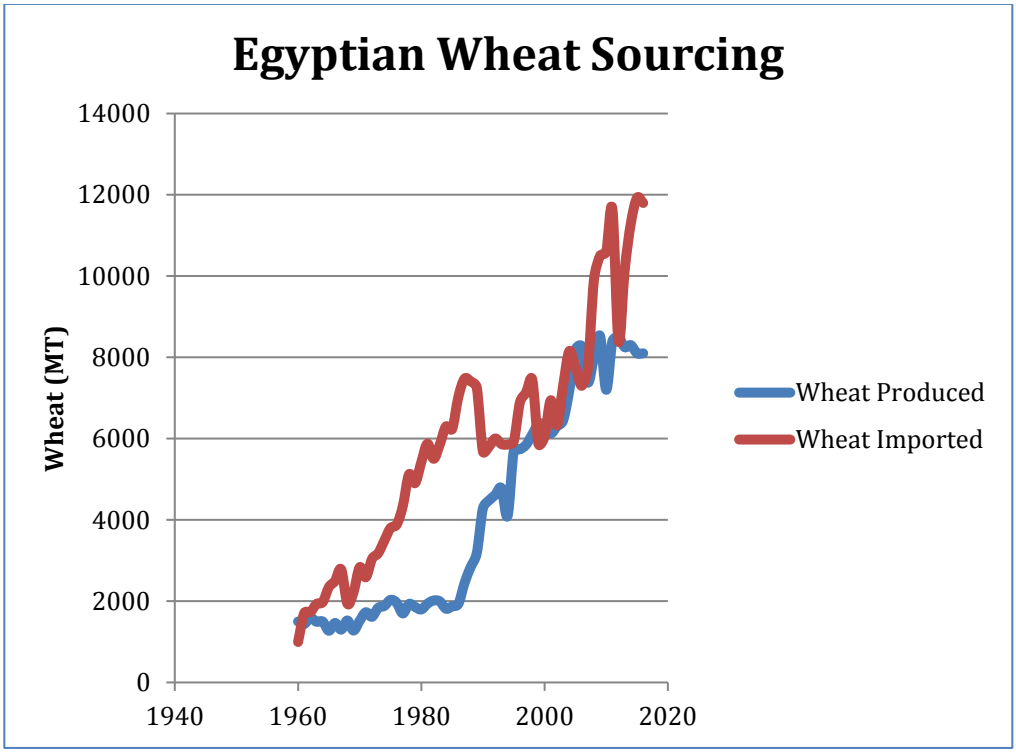


Cereal production vs. imports[74]

This figure could further demonstrate that the increase in importing behavior is the result of a weakened ability to produce domestically. Though the increasing trade deficit in cereals could be a result of a number of different factors, the truth is that the declining domestic production coincides with changes in the environment that have directly impacted agricultural land. Furthermore, the increase in importing of cereal grains demonstrates the fact that the citizens in this region rely heavily on this food source. As such, the governments of these countries have had to change their behavior (i.e. import more) in order to keep their citizens happy. However, as the Egyptian Revolution demonstrates, this was not always the case and the governments have been subject to shortcomings. There is only so much that can be imported at prices that are affordable to citizens to maintain their dietary habits and not revolt. Thus, the argument can be made that if Egypt was able to produce more wheat domestically, then it could have supported its citizens through global shortages and maintained the cost of living.

[74] FAO, 2015, *Regional Overview of Food Insecurity - Near East And North Africa: Strengthening Regional Collaboration To Build Resilience For Food Security And Nutrition*, (Cairo, Egypt, FAO).

Looking specifically to Egypt's import and production behavior, it is clear that the wheat produced and the wheat imported have experienced a relatively steady increase over the decades in order to feed the growing population of the country. However, a pattern becomes visible when these two data sets are graphed together. Since 1960, Egypt has almost always imported more wheat that it produced domestically. It should further be noted that the domestic production of wheat did catch up to the imported wheat in the late 90s. The two behaviors steadily rose together until about 2005 when importation of wheat experienced a steep rise in relation to domestic production, signaling a greater dependence on global wheat than domestically produced wheat.



Imported vs. produced wheat in Egypt[75]

[75] "Egypt Wheat Production by Year," IndexMundi, accessed February 20, 2017, http://www.indexmundi.com/agriculture/?country=eg&commodity=wheat&graph=production;

As has already been established, it is clear that Egypt relies heavily on the Nile as its primary water source. With the diminishing water supply as a consequence of climate change, experts from Egypt's Soils, Water and Environment Research Institute say that wheat crops will be down 40% and maize down 50% in less than 30 years. It is also estimated that for each degree the average global temperature increases, farmers who rely on the land will lose around $1,000 per hectare.[76] The recent shock to these crops as a result of soil salinization can be indirectly observed in the fact that as global food prices increased, Egyptians started to shift their consumption patterns to more cereal grains and subsidized bread.[77] That is because the prices of other local products, such as the more protein rich sources discussed above, experienced price increases greater than those experienced in imported products.[78] This demonstrates Egypt's inability to support its population domestically in times of global price volatility and is further exacerbated by the fact that the government is Egypt is among the countries that spend the most on food subsidy programs. This, coupled with the fact that just prior to the revolution, poor households purchasing power fell by 10% and nearly 22% of the population lived in extreme poverty, demonstrates the extremely delicate position that the country was in to maintain human security for its citizens across the board.[79]

It should be noted that the wheat that is used to make bread in the country is often a mix of both imported and domestically produced bread in order to improve the taste, meaning that the subsides that the government provides are impacted by both the global wheat price and the

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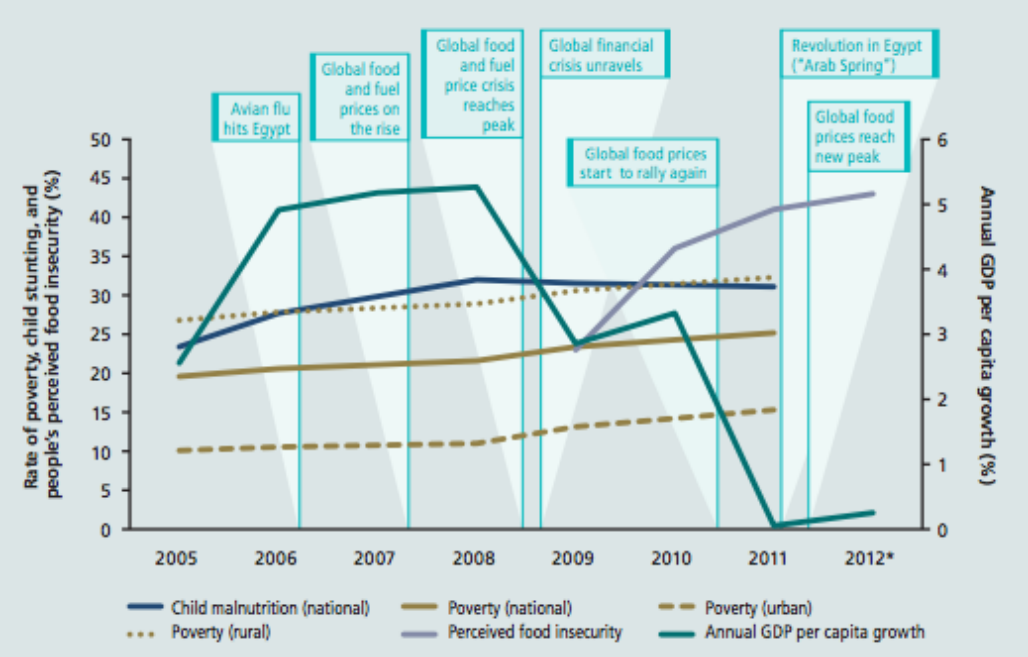
"Egypt Wheat Imports by Year," IndexMundi, accessed February 20, 2017, http://www.indexmundi.com/agriculture/?country=eg&commodity=wheat&graph=imports.
[76] Jack Shenker, "Nile Delta: 'We are going underwater. The sea will conquer our lands'."
[77] United Nations Development Programme, *Arab Development Challenges Report 2011.*
[78] Ibid.
[79] Ibid.

capability of the country to produce wheat domestically. Almost two thirds of the wheat in Egypt is used to make *baladi* bread, which is also the bread that is subsidized by the government essentially demonstrating the fact that the country grows wheat in order to support the subsidized bread program. Furthermore, nearly 75% of Egypt's population relies on this bread subsidy itself while poor households in Egypt consume the *baladi* bread on average 6.4 times a week. The dependence bread and wheat in the country is echoed in these very facts.[80]

History tells us that the 2011 Egyptian Revolution was not the first time that Egyptians rioted against the government for bread. In 1977, Egyptians had also taken to the streets to protest the cuts in subsidies during Anwar Sadat's presidency. Again in 2008, Egyptians protested the increasing wheat shortages under Hosni Mubarak. These same feelings were unresolved as bread remained a central issue during Egypt's participation in the Arab Spring.[81] As shown in the graph on the following page, starting in 2009, the perceived food insecurity of the Egyptian people started to rise sharply and continued through the revolution.

[80] Ghada Ahmed, Danny Hamrick, Andrew Guinn, Ajmal Abdulsamad, and Gary Gereffi, *Wheat Value Chains and Food Security in the Middle East and North Africa Region,* (Center on Globalization, Governance & Competitiveness, Duke University, 2013).
[81] Tom Perry and Abdel Rahman Youssef, "Special Report: Egypt's Brotherhood Turns to Flour Power," *Reuters,* June 13, 2013, accessed March 1, 2017, http://www.reuters.com/article/us-egypt-brotherhood-bread-specialreport-idUSBRE95C07P20130613.



Key food security and development indicators 2005-2012[82]

The documented impacts of climate change in Egypt demonstrate the fact that the country will suffer from an impact on the human security of its citizens via the ability to access and purchase food. As demonstrated through the projected SLR that will impact the Mediterranean Coast of the Nile Delta, the increased salinity in the region will damage cultivable cropland, and already has, as well as infiltrate freshwater sources that the agricultural sector is dependent on. This causal chain is extremely simple when broken down: increased global temperatures cause SLR which in turn damages and destroys the land on which local Egyptian farmers grow food to feed the country, thus making it more difficult to meet the demands of the wheat-dependent Egyptian citizens.

[82] Clemens Breisinger, *Tackling Egypt's Rising Food Insecurity in a Time of Transition* **(**Joint IFPRI-WFP Country Policy Note, May 2013) accessed February 10, 2017, http://documents.wfp.org/stellent/groups/public/documents/ena/wfp257519.pdf.

VIII. Conclusion

The world watched in awe as revolution after revolution erupted in the MENA region in 2011. Was it possible that we would observe the establishment of democratic states in such a volatile and unstable region? This hope persisted among the protesters in each country, as they demanded support from their governments. In Egypt, the people demanded Bread, Freedom, and Social Justice. In what is perhaps the most famous chant of the Revolution, the Egyptians exposed the troubling threat of climate related violence- an issue that is not unique to the country itself. The reason behind this is the issue of food security. However, as put by Anne Marie Slaughter, former Department of State Director of Policy Planning, the issue of food security lags behind other hot topics because "it is not immediate, and it is not sexy."[83]

Yet, the dominating nature of protests in the MENA region has been a spotlight for the issue of climate change and its relation to food security and violence, but only if states can recognize the relationship among these things. This recognition requires analyzing how climate change has contributed to environmental strains on food production within Egypt and the ways in which the food imports and domestic production shifted to match consumer demands. Here, we were able to find the connection between climate change and violence. Egypt's rich history and upsetting story of revolution lent itself as the perfect case study for doing so. How is it possible that one of the world's greatest ancient civilizations, brought to fruition by the natural fertility of its land, is plagued by food insecurity and among the most vulnerable to food price shocks today? The answer lies in its vulnerability to climate related impacts such as sea level rise.

[83] Ines Perez, "Climate Change and Rising Food Prices Heightened Arab Spring," *Scientific American,* March 4, 2013, accessed March 5, 2017, https://www.scientificamerican.com/article/climate-change-and-rising-food-prices-heightened-arab-spring/.

As the climate changes globally forced an increase in sea level, the salt water permeated the fertile land of the Nile Delta, making domestic food production suffer and increasing the dependence on imported wheat. The poorest Egyptians had become poorer and were no longer able to afford food in the same capacity as before due to price increases. Consequently, food security was threatened and the overall sense of human security was weakened, creating the perfect trigger for an uprising in an already unstable region.

In framing climate change as a security issue it works towards accomplishing the hefty task of getting developed countries to recognize the severity of the issue. The impacts of climate change typically seem detached from citizens in rich countries who are privileged with not only economic and political protections, but also benefit from pure geographic luck. Egypt, on the other hand, does not have the political or economic resources to protect its citizens from feeling the heat of climate change that will more harshly impact the country because of its location along the Mediterranean Sea. However, if the world continues to ignore the issue of climate change, then the consequences will become more severe for every country on Earth. As such, framing climate change in a way that connects it to an issue already regarded as important increases the likelihood of it being accepted and addressed by countries with the power to do so.

Despite the challenges presented to doing so by the Trump Administration, there is a beacon of hope in the Executive Branch. During a Senate Armed Services Committee confirmation hearing in January 2017, Secretary of Defense James Mattis acknowledged not only the existence of climate change, but also the legitimacy of sea level rise as a national security threat.[84] It is fundamental that we maintain this momentum and continue to shed light on

[84] Andrew Revkin, "Trump's Defense Secretary Cites Climate Change as National Security Challenge," *Scientific American,* March 16, 2017, accessed March 20, 2017,

instances in which climate change triggered real conflict around the world. The study of Egypt is only the beginning.

https://www.scientificamerican.com/article/trumps-defense-secretary-cites-climate-change-as-national-security-challenge/

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