

“A Period of Consequences”¹: The Historical Effects of Climate Change on Population Displacement and Their Implications for Governing Climate-Related Displacement, 1992-2018²

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¹ Al Gore, “The Climate Crisis And The Need For Leadership,” *Rolling Stone*, November 17, 2005, <https://www.rollingstone.com/politics/politics-news/the-climate-crisis-and-the-need-for-leadership-191947/>.

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Chapter I: Introduction and Motivation

The cars of the migrant people crawled out of the side roads onto the great cross-country highway, and they took the migrant way to the West. In the daylight they scuttled like bugs to the westward; and as the dark caught them, they clustered like bugs near to shelter and to water. And because they were lonely and perplexed, because they had all come from a place of sadness and worry and defeat, and because they were all going to a new mysterious place, they huddled together; they talked together; they shared their lives, their food, and the things they hoped for in the new country.³

John Steinbeck

Were one to confuse the description of migrants fleeing the Dust Bowl in *The Grapes of Wrath* for an account of migrants fleeing crisis somewhere in the world today, their mistake would be understandable. Millions of people are displaced each year for one reason or another,⁴ forced to leave their homes and in some cases cross international borders in order in the hope of finding shelter from war, disaster, want, or any other existential threats that face people the world over. The feelings of confusion and fear as well as the flicker of hope Steinbeck describes are the daily realities for these unfortunate masses, many of whom are never afforded the protection they are entitled to under international law.

However, *The Grapes of Wrath* serves as an apt analogy for another reason. The disaster central to Steinbeck's narrative is an ecological one, where the combination of drought and human mismanagement culminated in the collapse of American agricultural societies. In this sense, the Dust Bowl is not dissimilar from the current environmental crisis facing the world today, as human impacts on the environment are fundamentally changing the climate to the detriment of the most vulnerable populations on Earth.

³ John Steinbeck, *The Grapes of Wrath* (New York: The Modern Library, 1939), 264.

⁴ Lauren Leatherby, "More Refugees are Seeking Shelter. The U.S. is Taking Fewer," *Bloomberg*, June 20, 2019, <https://www.bloomberg.com/graphics/2019-venezuela-migration-refugees-record-displacement/>.

Why Study Historical Climate Displacement?

Relatively little attention has been paid to the current impact of climate change on displacement by scholars, international organizations, and the media relative to the future implications of this on national governments. This is a glaring omission, especially considering the fact that climate change is *not* a potential future, but today's reality. Additionally, because today's displacement crises coincide with climate change, the likelihood that some portion of the displaced populations were forced to leave their homes by climate change or one of the intermediary factors linked to climate change. This failure to look to the recent past and present for an understanding of the importance of climate change to displacement informed the central research question of this project: what has been the role of climate change in forcing displacement historically? The answer to this question will also help inform a judgement of the international displacement regime, both in terms of its legal structure. In doing so, it will help answer the second research question, namely does the international refugee regime have the capacity or the legal flexibility to deal with the levels of displacement caused by climate change?

I approach the first research question through the analysis of several quantitative models constructed from datasets made available by the UNHCR, NASA, the University of Gothenburg, and the University of East Anglia. I fit a series of linear regression models for regional and country level observations and adjusted in subsequent trials to control for different factors in order to distinguish climate related displacement from displacement caused by other factors. Because it is likely impossible to know what the perfect model for determining climate change's role in displacement, this is an exploratory analysis designed to surmise possible bounds of the magnitude of displacement. If climate change is playing a role in displacement, there should be an increase in climate associated displacement as climate change grows more severe.

Additionally, in order to demonstrate that climate change poses a risk to the functionality of the international displacement regime, the magnitude of climate related displacement would have to be at or above the level of a known displacement event. Because it is a recent and ongoing example of the failure of the international refugee regime, the Mediterranean migration crisis is a useful example for the purpose of comparison.

To answer the second research question, I assess the current refugee regime considering the results from the linear regressions performed on relevant datasets. This assessment takes into account the scale of displacement, the types of displacement, and whether persons displaced by climate related phenomena qualify for protection as refugees, asylum seekers, or other legally protected groups under international law. After providing a judgement of the readiness of the displacement regime, I offer recommendations for potential areas for improvements or means of supplementing the regime in areas of relative weakness. These recommendations also consider extant literature on future levels of displacement since there is little merit to amending the system in a way that be made obsolete in the decades to come.

As stated previously, most of the extant literature on climate change and displacement deals with future displacement projections or specific examples of climate related displacement. Examples of the first type of publication are commonly released by intergovernmental organizations and public policy think tanks, such as the World Bank's "Groundswell" report from 2018,⁵ whereas the second is typified by country level case studies like those on low lying islands.⁶ While these documents base their projections on current data, they tend to focus on modeling projected future displacement, often linked to several possible levels of warming. The

⁵ Rigaud, Kanta Kumari, Alex de Sherbinin, Bryan Jones, Jonas Bergmann, Viviane Clement, Kayly Ober, Jacob Schewe, Susana Adamo, Brent McCusker, Silke Heuser, and Amelia Midgley. "Groundswell: Preparing for Internal Climate Migration." *The World Bank Group*. Washington: The World Bank (2018).

⁶ Mortreux, 105.

logic behind this is reasonable to an extent; if climate change is expected to get worse over time, it stands to reason that displacement stemming from climate change will get more severe in kind.

However, implicit in this study of climate related displacement is a bias that treats climate change as a future issue rather than one with a current, measurable impact on countries and populations around the world. The gap created by this tendency can only be addressed by looking to the ways in which climate change has influenced displacement historically. Failure to account for historical displacement stemming from climate change leaves a major gap in contemporary analysis of the issue, as it creates a tendency to focus on a potential future to the detriment of those being impacted by climate change right now.

Beyond the academic importance of writing in the recent past and present to any understanding of climate related displacement, there are powerful normative justifications for expanding current understanding the impacts of climate change on displacement. One reason for this is because reframing climate change in terms of a current issue rather than the far-off apocalyptic event it is often described as there may be more incentive to engage with the issue in a meaningful way. While the positive impact of this reframing is far from guaranteed, especially in a country where belief in climate change correlates so strongly with partisan identification.⁷ Nonetheless, reframing climate change in a manner that treats it as a current issue rather than merely a future threat has sometimes proven successful in past attempts. For example, despite the Trump Administration's choice to remove mention of climate change from the most recent national security strategy,⁸ the military continues to treat it as a major threat and is taking mitigation steps independent of other elements of the federal government. This is largely because

⁷ Kerrie L. Unsworth and Kelly S. Fielding. "It's political: How the salience of one's political identity changes climate change beliefs and policy support." *Global Environmental Change* 27 (2014): 131-137.

⁸ Julian Borger, "Trump Drops Climate Change from US National Security Strategy," *The Guardian*, December 18, 2017, <https://www.theguardian.com/us-news/2017/dec/18/trump-drop-climate-change-national-security-strategy>.

scholarship has demonstrated the role of climate change as a confounding factor in national security⁹ and because internal studies have revealed the vulnerability of U.S. bases to climate related phenomena, especially sea level rise.¹⁰

There is also a second component of normative importance that goes beyond understandings of climate change for their own sake. The role that climate change plays in displacement is complicated, and oftentimes the relationship between the effects of climate changes and the forces that cause displacement is circuitous. Nonetheless, analysis of climate change's role in displacement remains important because of the risk to human life and wellbeing involved in this dynamic. Displacement is often talked about in such staggering figures that the human element can become muddled or overlooked. Each of the 25 million environmentally displaced persons in the world today faces intense challenges to their material wellbeing, yet most lack the resources to cope with the challenge posed by displacement.¹¹ Failure to address these challenges will simply compound the humanitarian issues associated with their displacement and deprivation until the point of crisis. Both in the past and in current waves of displacement, this translates to death and suffering on the part of those without any means to fend for themselves, which culminates in avoidable tragedies like the mass drowning of refugees in the Mediterranean.¹² The moral importance of this project is further compounded by the fact that climate change threatens to drastically exacerbate the issue of displacement.

⁹ Jon Barnett, "Security and climate change." *Global environmental change* 13, no. 1 (2003): 7-17.

¹⁰ Ben Watson, "These Are the US Military Bases Most Threatened by Climate Change," *Defense One*, June 12, 2019, <https://www.defenseone.com/threats/2019/06/these-are-us-military-bases-most-threatened-climate-change/157689/>.

¹¹ Brown.

¹² Samantha Raphelson, "More Than 3,100 Migrants Died Crossing Mediterranean In 2017," *NPR*, January 6, 2018, <https://www.npr.org/sections/thetwo-way/2018/01/06/576223035/more-than-3-100-migrants-died-crossing-mediterranean-in-2017>.

As for the second research question, it would be incorrect to say there is a gap in the literature so much as the question deals with an emergent field of displacement literature. Discussions of the success and failure of international institutions are not new, nor are they limited to judgements on the international refugee regime. One of the foundational texts for the study of climate governance, David Victor's *Global Warming Gridlock*, is itself a criticism of the manner in which agreements governing international climate policy are negotiated and implemented.¹³ Unlike Victor's work, the impetus for criticism of the displacement regime has been a perceived inability on the part of the United Nations, European Union, and other entities to deal with the ongoing migration crisis in the Mediterranean. Most of the literature engaged in this criticism neglects to cover issues of climate change despite the importance of environmentally related displacement, which is the main purpose for including this topic as a research question. By examining how climate change has affected displacement historically, it may be possible to validate or invalidate criticism of the refugee regime based on the limitations observed in the Mediterranean since 2015.

Much of the normative importance of this question is shared with the first research question. As a means of determining the success or failure of the international refugee regime in meeting the needs of displaced populations, the question's importance is mainly linked to human security. My judgement of the current system takes place in the context of its carrying capacity for displaced persons. This is achieved through comparisons of the number of people that can be considered climate refugees in my models to the number stemming from notable mass displacements. Should the number be beyond levels at which the international refugee regime struggled to cope, then it may plausibly be argued that the current system is unprepared for

¹³ Victor.

climate displacement at current levels. From there, an analysis of the current system's strengths and weaknesses can be used in conjunction with analysis of the relevant data in order to determine an approach to amending the international displacement regime.

The Status of Climate Change

The overwhelming majority of the scientific community, intergovernmental organizations, and nongovernmental organizations dealing with environmental issues in any way recognize climate change as a legitimate phenomenon,¹⁴ and the denialist positions taken by some American commentators are not recognized as scientifically sound.¹⁵ One of the key features of contemporary climate change is an upward trend in mean global temperatures, which is responsible for the emergence of the term global warming in public discourse. Though these terms are often made to seem synonymous, climate change describes general changes to the global climate system, whereas global warming refers specifically to the contemporary temperature rise and related phenomena.¹⁶ Most current projections put the global mean temperature increase at approximately 1 degree Celsius since 1800,¹⁷ though the temperature change varies regionally.¹⁸ This particular warming event is also understood as something of a unique moment in global environmental history, as shifts in warming typically occur over millennia. By contrast, the current warming trend has emerged in the last two centuries with average global temperatures rising 0.8 degrees Celsius between 1880 and 2018.¹⁹

¹⁴ Fredrik Albritton Jonsson, "The Industrial Revolution in the Anthropocene," *The Journal of Modern History* 84, no. 3 (September 1, 2012), 679-680.

¹⁵ Naomi Oreskes, "The Scientific Consensus on Climate Change," *Science* Vol. 306, Issue 5702, December 3, 2004, <https://science.sciencemag.org/content/306/5702/1686.summary>, 1686.

¹⁶ "Overview: Weather, Climate Change, and Global Warming," NASA, <https://climate.nasa.gov/resources/global-warming-vs-climate-change/>.

¹⁷ Brad Plumer and Nadja Popovich, "Why Half a Degree of Global Warming Is a Big Deal," *New York Times*, October 7, 2018, <https://www.nytimes.com/interactive/2018/10/07/climate/ipcc-report-half-degree.html>.

¹⁸ "Data," *University of East Anglia Climatic Research Unit*, <http://www.cru.uea.ac.uk/data>.

¹⁹ *Ibid.*

The warming trend of the past two centuries strongly correlates with a dramatic rise in the concentration of carbon dioxide and other so-called “greenhouse gases” in the atmosphere.²⁰ These gases occur naturally, but the levels seen today have not occurred at any point in the past 650,000 years, a period that saw seven full glacial cycles (a period of glacial expansion followed by retreat) during which there is normally some fluctuation in the mean global temperature.²¹ The uptick starting around the turn of the 19th century is the result of human activity, primarily industrialization, which saw the widespread adoption of fossil fuels for power, manufacturing, agriculture, and other industries.²² This correlation between industrialization, greenhouse gas emissions, and global warming is the basis of the anthropogenic, or man-made, theory of climate change. This theory ascribes contemporary climate change primarily to human activity and is the consensus theory among the overwhelming majority of climate scientists and governmental agencies today, with the National Aeronautics and Space Administration (NASA) reporting a greater than 95% degree of confidence that the scale of changes to the climate are the result of human action.²³ Current projections from the British Geological Survey indicate that human activity will be responsible for anywhere between 1.4 and 5.4 degrees Celsius of warming by the end of the century.²⁴

This level of warming is associated with severe ecological challenges, including increased frequency and severity of extreme weather events, resource scarcity, and decreased habitability in vulnerable areas of the world. However, the international community’s efforts thus far have been minimal at best. The limited scope and incrementalism of successive climate

²⁰ “Climate Change: How Do We Know?” NASA, <https://climate.nasa.gov/evidence/>.

²¹ Ibid.

²² Jonsson, 679.

²³ “Climate Change: How Do We Know?”

²⁴ “Man-Made (Anthropogenic) Greenhouse Gases,” *British Geological Survey*, n.d., <https://www.bgs.ac.uk/discoveringGeology/climateChange/CCS/Anthropogenic.html>.

agreements rendered attempts to constrain the effects of climate change completely ineffectual. This issue has been compounded by American recalcitrance in the face of agreements such as the Kyoto Protocol²⁵ and the Paris Climate Accord, despite the fact that the U.S. government played an outsized role in the latter agreement's content.²⁶ The potential to mitigate the worst effects of climate change is greatly undermined by these failures, leading some commentators to speculate that the limits set by the Paris Climate Accord are insufficient to stop climate change.²⁷ If the international community is unable to limit climate change, it must be prepared to deal with its consequences.

The Problems with Governing Displacement

One of the issues that could potentially result from a failure to address climate change is mass displacement, which poses a serious threat to human life and material wellbeing as well as to political stability and governance capacity. It is no stretch to assume that the current climate crisis could create displacement of the sort chronicled in Steinbeck's novel. During the Dust Bowl, upwards of 2.5 million Americans became internally displaced,²⁸ many of whom relocated permanently. The nature of this displacement was complex and its effects far reaching for American society, but it was largely limited to the confines of America's borders. Indeed, considering how pervasive a force contemporary climate change is relative to a more localized environmental crisis like the Dust Bowl, the world could be dealing with even more severe levels of displacement than those from past ecological crisis.

²⁵ David G. Victor, *Global Warming Gridlock: Creating More Effective Strategies for Protecting the Planet* (Cambridge: Cambridge University Press, 2012), 216.

²⁶ Michael R. Pompeo, "On the U.S. Withdrawal from the Paris Agreement," November 4, 2019, <https://www.state.gov/on-the-u-s-withdrawal-from-the-paris-agreement/>.

²⁷ "IPCC Concludes Paris Accord Is Not Enough to Limit Global Warming," *Al Jazeera*, October 10, 2018, <https://www.aljazeera.com/news/2018/10/ipcc-climate-change-report-paris-climate-accord-181009134051255.html>.

²⁸ Brian Resnick, "What America Looked Like: The Dust Bowl," *The Atlantic*, February 17, 2012, <https://www.theatlantic.com/national/archive/2012/02/what-america-looked-like-the-dust-bowl/253220/>.

Is the international community capable of dealing with mass displacement brought on by climate change? Recent history suggests not. The current mass movement of people, the ongoing transit of war refugees, economic migrants, and asylum seekers across the Mediterranean and Aegean seas into Europe from Western Asia and Northern Africa has been the focus of intense scrutiny and strong reactions across the political spectrum, albeit in a highly polarized way. By the end of 2016, approximately one year into the crisis, nearly 5.2 million people had arrived in Europe as part of this wave of migration and thousands more had drowned while attempting to cross the sea.²⁹ While many governments initially supported the resettlement of refugees and other migrants,³⁰ reactions by right-wing and Eurosceptic political parties on the continent against mass migration and open borders agreements like the European Union's Schengen area resulted in changes to these policies.³¹ Eventually, agreements were signed with the Turkish government³² and some of the armed factions in Libya to contain or police the flow of migrants coming into Europe with little effort made by national governments to meet the human security needs of those affected.³³

²⁹ "Refugee Crisis in Europe," *USA for UNHCR*, 2019, <https://www.unrefugees.org/emergencies/refugee-crisis-in-europe/>.

³⁰ Luke Harding, "Angela Merkel Defends Germany's Handling of Refugee Influx," *The Guardian*, September 15, 2015, <https://www.theguardian.com/world/2015/sep/15/angela-merkel-defends-germanys-handling-of-refugee-influx>.

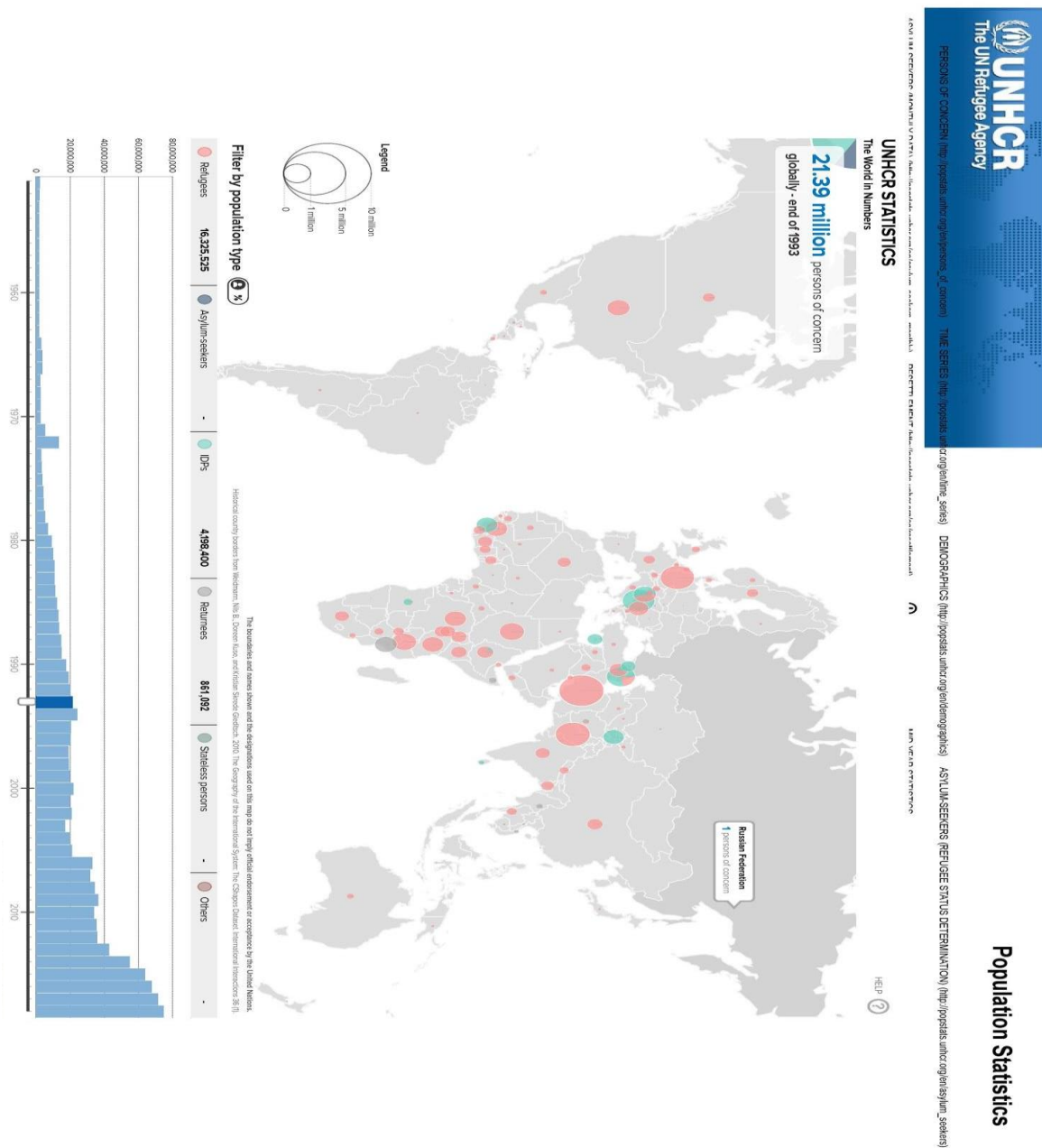
³¹ Paul Taggart and Aleks Szczerbiak, "Putting Brexit into Perspective: The Effect of the Eurozone and Migration Crises and Brexit on Euroscepticism in European States," *Journal of European Public Policy* 25, no. 8 (May 21, 2018): 1194.

The Schengen Area is a region that encompasses much of the European Union and European Economic Area in which there are limited or nonexistent border controls. While there are customs checks before getting into or leaving the Schengen Area, there is free movement within the area, which is intended to facilitate the movement of people, goods, and capital throughout Europe.

³² "Legislative Train 09.2019 8 Towards A New Policy On Migration: EU-Turkey Statement and Action Plan," (European Parliament, September 2019), <http://www.europarl.europa.eu/legislative-train/theme-towards-a-new-policy-on-migration/file-eu-turkey-statement-action-plan>

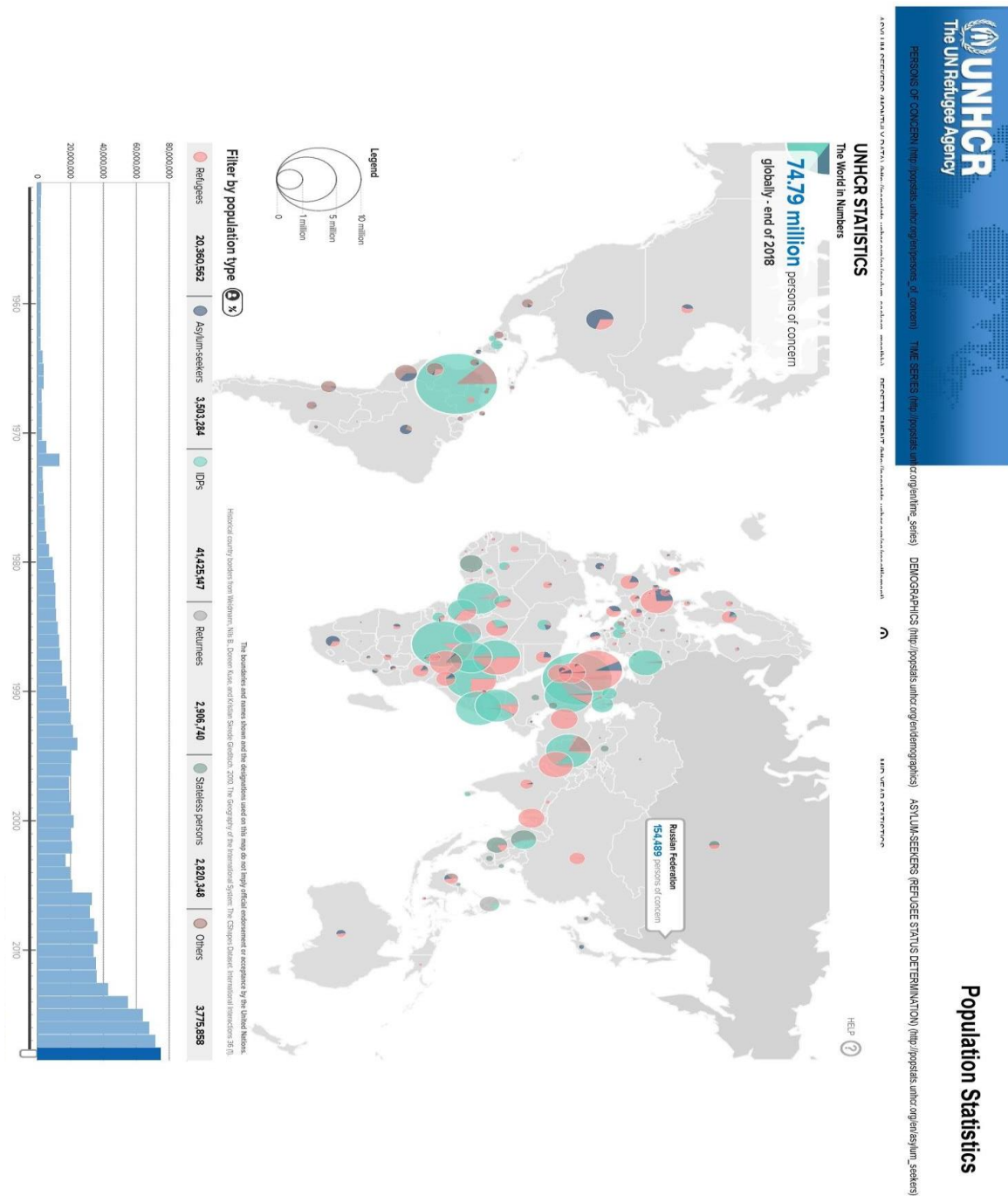
³³ Sally Hayden, "The U.N. Is Leaving Migrants to Die in Libya," *Foreign Policy*, October 10, 2019, <https://foreignpolicy.com/2019/10/10/libya-migrants-un-iom-refugees-die-detention-center-civil-war/>.

The current displacement issue is even worse at a global level. At the end of 1993, the first year for which the United Nations High Commissioner for Refugees (UNHCR) began reporting on displaced populations using the current population categories, there were 21.39 million displaced persons around the world. By the end of 2018, this number had increased 74.79 million displaced persons, an increase of nearly 250%. An increase of this magnitude cannot be explained by mere population growth, as the global population increased roughly 36% over the same timeframe. Figures 1 and 2 provide a comparison of the number of displaced persons under the care of the UNHCR in the years 1993 and 2018 respectively (in the charts, red indicates refugees, green indicates internally displaced persons, and the size of the circle corresponds to the size of the population). Over the course of the quarter century charted by these maps, the total displaced population under the purview of the UNHCR increased from 21.39 million to 74.79 million, though the causal factors for this increased displacement are numerous.

Figure 1.1: Displacement in 1993³⁴

Data and Graphic from UNHCR

³⁴ “UNHCR Statistics,” United Nations High Commissioner for Refugees, 2018, <http://popstats.unhcr.org/en/overview>.

Figure 1.2: Displacement in 2018³⁵

Data and Graphic from UNHCR

³⁵ Ibid.

The failure of international governments to respond effectively to this crisis raises important questions about the difficulty posed by climate related displacement and the efficacy of the international displacement regime. While the displacement from Syria, Afghanistan, and elsewhere in West Asia and Africa is high, there is significant potential for future displacements resulting from climate change to be much higher. In 2008, the United Nations Intergovernmental Panel on Climate Change (IPCC) issued a report in which it estimated that climate change could be responsible for up to 200 million people by 2050. In the same report, previous estimates of the number of people displaced by environmentally related phenomena in 2005 to be approximately 25 million.³⁶ Considering the toll that approximately 5 million displaced persons took on Europe's political will to enforce international law, a figure 5 to 40 times as much has the potential to generate a crisis that would dwarf that in the Mediterranean.

The potential for this level of displacement to overwhelm national governments is compounded by the fact that there is no displacement regime currently in place that was designed to address issues of climate *or* environmentally related displacement. The only extant international legal regimes governing displaced people are those administered by the UNHCR³⁷ and The United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA),³⁸ which hold jurisdiction over forcibly displaced persons and persons displaced from the former Mandate of Palestine and their descendants respectively. Both of these institutions

³⁶ Oli Brown, "Migration and Climate Change," (International Organization for Migration, 2008).

There is a distinction that needs to be made between climate related and environmentally related displacement. While similar, climate related displacement is displacement resulting specifically from climate change related phenomena, whereas environmentally related displacement can be related to climate change or other issues affecting the environment generally (i.e. non-climate related natural disaster, oil spill or other human related non-climatic environmental disaster, etc).

³⁷ "An Introduction to International Protection Protecting Persons of Concern to UNHCR," (United Nations High Commissioner for Refugees, August 1, 2005), <https://www.refworld.org/docid/4214cb4f2.html>, 7.

³⁸ "GENERAL ASSEMBLY RESOLUTION 302" (United Nations Relief and Works Agency for Palestine Refugees in the Near East, December 8, 1949), <https://www.unrwa.org/content/general-assembly-resolution-302>.

deal with political and violence-based displacement and have remained largely unchanged since their creation in 1949. Neither regime has been adapted to deal with stressors that facilitate the displacement of people beyond war and persecution from one's home country.³⁹ This inflexibility created difficult situations like the Mediterranean migration crisis, where displaced persons were not always entitled to legal protection despite their acute vulnerability and the similarity of their circumstances to those of more classically defined refugees.⁴⁰ The refugee regime was created to accommodate victims of war, but since this time nothing has been done to expand the scope of the regime to protect individuals whose displacement cannot be attributed to conflict or some mode of persecution. As such, there is no legal mechanism that affords protections to those at risk of displacement due to climatic factors.

Project Structure:

My two primary research questions for this project are as follows: how has climate change affected displacement historically and is the international refugee regime capable of coping with climate displacement? These questions require fundamentally different approaches, which is reflected in the structure of the project outlined below.

Chapter II introduces my literature review and the theory underlying the quantitative work I do in Chapters III, IV, and V. In this chapter, I examine scholarly work on climate change, displacement, and the relationship between the two as well as some of the work on these topics from non-academic sources (particularly NGOs, governments, and international

³⁹ "Why Climate Migrants Do Not Have Refugee Status," *The Economist*, March 6, 2018, <https://www.economist.com/the-economist-explains/2018/03/06/why-climate-migrants-do-not-have-refugee-status>.

⁴⁰ Saphora Smith, "Europe Grapples with Distinction between Refugees and Economic Migrants," *NBC News*, February 2, 2019, <https://www.nbcnews.com/news/world/europe-grapples-distinction-between-refugees-economic-migrants-n965161>.

organizations). At the end of this chapter, I present a number of testable implications that guide the analysis of the quantitative findings in Chapter IV.

Chapter III of this thesis concerns the methodology I use to analyze the historical effects of climate change on displacement. Using data from the UNHCR, University of Gothenburg's Quality of Governance Dataset, and NASA climate data, I construct a series of linear models that analyze the relationship between climate change and displacement through several different variables. Chapter III outlines what these variables are, how they are measured, and why they are important to this study. This chapter also provides some descriptive statistics to show what relationships exist in the data and check the assumptions made in the literature review based on research. There is also be a section of the chapter dedicated to some of the methodological and other challenges to studying climate change, displacement, and the intersection of these phenomena.

Chapter IV presents quantitative models that I use to understand the role of climate change historically. Both climate change and displacement have grown worse in recent years, and if climate change has influenced displacement in the past, then climate induced displacement should increase as climate change gets worse. Of course, the causal path between climate change and displacement is complex. While some effects of climate change, such as hurricanes or natural disasters, can cause immediate displacement, other paths of causation involve longer chains of causation with greater numbers of intervening steps between climate change and displacement. In order to examine the relationship between climate change and displacement, I examine the relationship between climate change and each of the control variables I use. From there, I create a "best" and "worst" case scenario model, which together form a range of possible of possible impacts by climate change on displacement. For each of these models, there is a

global model as well as a series of regionally clustered models to assess the net effect of climate change as well as some of the regional variation in climate induced displacement.

Chapter V will take a closer look at two cases of displacement, the Second Iraq War (2003-2011) and the Syrian Civil War (2011-present). Both cases are of conflicts that have major non-climate related causes; Iraq's most direct cause was the U.S.'s decision to issue an authorization for the use of force in 2002, and Syria's biggest cause was the Assad regime's decision to open fire on protesters during the Arab Spring. However, as discussed previously, climate change can be a confounding factor in conflict by exposing already vulnerable populations to threats like drought, famine, elevated temperature, and other existential dangers. Since both conflicts are international conflicts with civil elements (though the importance of each of these descriptors differs by case), and since they are temporally and geographically close they lend themselves to easy comparison. For the purposes of this comparison, the final models from Chapter IV is geographically constrained to Iraq and Syria and the effect of climate change on displacement throughout the course of each conflict.

Chapter VI summarizes the results of my analysis. This mostly concerns interpreting the results of the models from these chapters but also includes explaining any unexpected results and examining possible sources of error within the models. Additionally, in interpreting these models, it is possible to understand the threat posed by future displacement given how the international community has responded to these displacements. From there, it is possible to determine whether the international refugee regime as it currently exists can cope with the pressure of climate displacement in a way that provides for the political and material needs of displaced people. Based on the results of previous chapters and projections of future displacement levels from works such as those cited in Chapter I, I argue that the legal regime is

not strong enough and does not offer broad enough protections to protect vulnerable populations affected by climate change. Using this same information, I provide a brief analysis of the risks of inaction, if any, and what the obstacles to amending this legal regime are.

Chapter II: Studying the Effects of Climate Change on Displacement

Our optimism, indeed, is admirable, even if we say so ourselves. The story of our struggle has finally become known. We lost our home, which means the familiarity of daily life. We lost our occupation, which means the confidence that we are of some use in this world. We lost our language, which means the naturalness of reaction, the simplicity of gestures, the unaffected expression of feelings.⁴¹

Hannah Arendt
We Refugees

The future level of climate change is difficult to precisely predict, and policy changes could determine whether the Earth warms faster or slower than it currently is. However, by relying on the historical trends in climate data, we can create a useful understanding of what effect it has had on displacement thus far. This in turn can be used to assess how much of global displacement in the past results from climate change, what different warming scenarios would do in the future, and how particular displacement events have been affected by climate change. In this chapter, I examine how climate related displacement functions in practice as well as the ways researchers have studied displacement, climate change, and the relationship between these phenomena in the past.

Modes of Climate Related Displacement

Climate change is a phenomenon with wide reaching effects, which can create issues in regard to parsing the causal relationship between climate change and displacement. Because of this, climate change can lead to displacement directly or through a longer causal chain with any number of intermediary variables. To understand how these simple and complex causal

⁴¹ Hannah Arendt, “We Refugees,” in *The Jewish Writings*, <https://www.jus.uio.no/smr/om/aktuelt/arrangementer/2015/arendt-we-refugees.pdf>, 264.

relationships function, consider the figure below, which outline some examples of these relationships:

Figure 2.1: Example Models of Climate Displacement

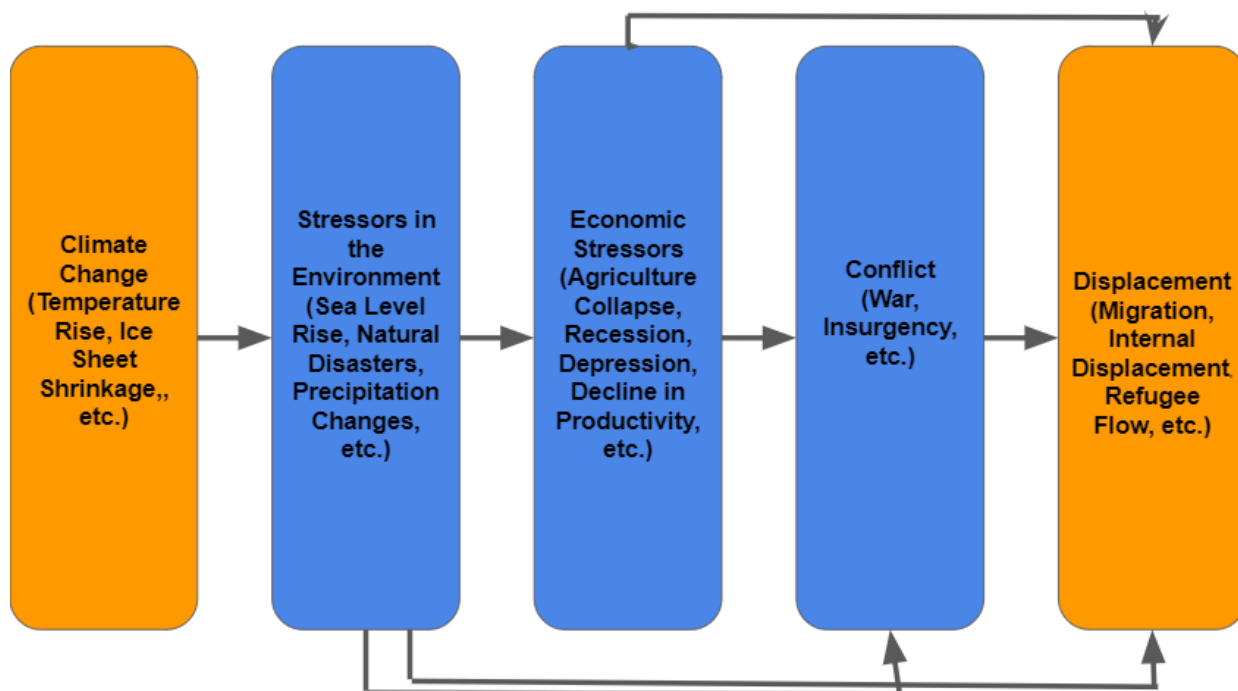


Figure by Author

In some instances, there is a straight line between climate change and population displacement. In many cases from the recent past, extreme weather events have been made worse by climate related factors such as temperature shifts, sea level rise, and atmospheric shifts. These events are acute disasters irrespective of the influence of climate change, but they are also among the most visible ways the effects of climate change manifest themselves. One prominent example these disasters are hurricanes,⁴² which became important points of discussion in the popular

⁴² “Global Warming and Hurricanes,” *NOAA Geophysical Fluid Dynamics Laboratory* (blog), August 15, 2019, <https://www.gfdl.noaa.gov/global-warming-and-hurricanes/>.

debate about climate related disasters after major storms like Hurricanes Harvey,⁴³ Maria,⁴⁴ and Dorian⁴⁵ caused widespread destruction in rapid succession. The National Oceanic and Atmospheric Administration (NOAA) reports that climate change is a key factor in the increasing frequency and intensity of hurricanes, and this same relationship has been shown for other extreme weather events as well.⁴⁶

Often, however, the relationship between climate change and the causes of displacement is less direct. For example, climate change can create conditions of deprivation or protracted ecological disaster that result in displacement like that seen during the Dust Bowl. The archetype for this mode of disaster is drought, which like hurricanes and other storms has an intimate link to climate change related shifts in precipitation.⁴⁷ Even prior to anthropogenic climate change of the severity currently being experienced, drought played a major role in displacement. Droughts like the one that ravaged Central Europe in 1540 are among the most severe (if not particularly long) in recorded history despite the more limited carbon emissions released by pre modern societies.⁴⁸ Other droughts in the early 20th century like those in China and the Soviet Union claimed millions of lives and created mass displacement in affected regions.⁴⁹ In these cases, the

⁴³ Henry Fountain, "Scientists Link Hurricane Harvey's Record Rainfall to Climate Change," December 13, 2017, <https://www.nytimes.com/2017/12/13/climate/hurricane-harvey-climate-change.html>.

⁴⁴ Rebecca Hersher, "Climate Change Was The Engine That Powered Hurricane Maria's Devastating Rains," *NPR*, April 17, 2019, <https://www.npr.org/2019/04/17/714098828/climate-change-was-the-engine-that-powered-hurricane-marias-devastating-rains>.

⁴⁵ John Schwartz, "How Has Climate Change Affected Hurricane Dorian?," *The New York Times*, September 3, 2019, <https://www.nytimes.com/2019/09/03/climate/hurricane-dorian-climate-change.html>.

⁴⁶ "Global Warming and Hurricanes."

⁴⁷ "What Is Drought?," *National Drought Mitigation Center University of Nebraska* (blog), <https://drought.unl.edu/Education/DroughtforKids/WhatIsDrought.aspx>.

⁴⁸ Rene Orth et al., "Did European Temperatures in 1540 Exceed Present-Day Records?," *Environmental Research Letters*, November 15, 2016, <https://iopscience.iop.org/article/10.1088/1748-9326/11/11/114021>.

⁴⁹ Jingfeng Xiao et al., "Twentieth-Century Droughts and Their Impacts on Terrestrial Carbon Cycling in China," *Earth Interactions*, September 11, 2009, <https://journals.ametsoc.org/doi/full/10.1175/2009EI275.1>.

mechanisms that make droughts lethal or generative of displacement are factors like famine and water scarcity, which are direct threats to human security in affected regions.

Both of these factors also serve as examples of scarcity which also plays a clear role in generating conflict and displacement, especially in instances where life essential resources like food and water are constrained to a level below the current carrying capacity of a region.⁵⁰ Conflict for resources can take a number of different forms, all of which can result in displacement to a certain extent. On the less acute end, the use of martial force can be used to redistribute water access, as has occurred in the Occupied West Bank through the construction of illegal settlements and the incorporation of major agricultural areas into the Israeli-administered Area C.⁵¹ In more extreme cases, droughts and accompanying resource scarcity can play a role in the outbreak of war. This topic has gained traction in recent months due to discussion of the role of drought in the beginning of the Syrian Civil War. Syria experienced a significant drought between 2006 and 2007, which caused internal displacement in agrarian communities.⁵² Some researchers have hypothesized that the movement of people into Syria's cities coupled with the economic dislocation they experienced created the grievances necessary for the mass protests that kicked off the conflict.

This is not to say that climate change is the sole factor in cases of climate related displacement. Nor does it absolve national governments of responsibility for mishandling or exacerbating crises related to climate change. Often, ecological disasters can be enflamed by

⁵⁰ Ole Magnus Theisen, "Blood and soil? Resource scarcity and internal armed conflict revisited." *Journal of Peace Research* 45, no. 6 (2008): 801.

⁵¹ Tariq Judeh, Marwan Haddad, and Gül Özerol. "Assessment of water governance in the West Bank, Palestine." *International journal of global environmental issues* 16, no. 1-3 (2017): 119.

⁵² Colin P. Kelley, Shahrzad Mohtadi, Mark A. Cane, Richard Seager, and Yochanan Kushnir. "Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought." *Proceedings of the National Academy of Sciences of the United States of America* 112, no. 11 (2015): 3241-3242.

poor governance and the intentional withholding of aid, as occurred in Ethiopia and occupied Eritrea under the Derg regime during the 1983-1985 famine and Saudi occupied areas of Yemen today.⁵³ Additionally, leaders like Bashar al-Assad and Salva Kiir Mayardit in South Sudan have both deliberately utilized state force to kill or displace citizens of their respective countries, which are choices that cannot be directly ascribed to climate change.⁵⁴ However, the presence of other causal factors in explanations of displacement does not diminish the role of climate change as a cause of displacement. Rather, it is important to understand that the relationship between climate change and conflict is complicated and there are many causal paths between climate change and conflict related displacement.

Even in cases where climate induced resource scarcity does not generate conflict, it can still cause displacement. This is particularly true of economically underdeveloped areas that rely on subsistence activities like farming and fishing, such as coastal Alaska and Louisiana in the context of the United States.⁵⁵ There are numerous ways climate change can have a detrimental effect on local economies. In fishing communities like those in the arctic, rising ocean temperatures can kill off or force the migration of fish stocks to a point that fishermen in these

⁵³ Jason W. Clay and Bonnie K. Holcomb, *Politics and the Ethiopian famine: 1984-1985*, Vol. 20. Transaction Publishers, 1986.

“Yemen: Events of 2018,” *Human Rights Watch*, 2019, <https://www.hrw.org/world-report/2019/country-chapters/yemen>.

⁵⁴ “Syria war: Lawyers submit first war crimes cases against Assad,” *BBC*, March 7, 2019, <https://www.bbc.com/news/world-middle-east-47483714>.

“South Sudan officials may be guilty of war crimes: UN report,” *Al Jazeera*, February 23, 2018, <https://www.aljazeera.com/news/2018/02/south-sudan-officials-guilty-war-crimes-report-180223152525125.html>.

⁵⁵ Julie Koppel Maldonado, Christine Shearer, Robin Bronen, Kristina Peterson, and Heather Lazrus. “The impact of climate change on tribal communities in the US: displacement, relocation, and human rights.” In *Climate Change and Indigenous Peoples in the United States*, 93..

communities lose their livelihoods.⁵⁶ Elsewhere, factors such as coastal erosion, extinction events, and other ecological consequences can adversely impact economic outcomes in vulnerable industries. While the mechanism of environmental degradation can vary and the consequences of said degradation can be manifold, lack of opportunity often serves as an impetus for movement among disaffected communities.

Furthermore, even when issues of resources and economic opportunity remain are not severe enough to cause mass movement issues of habitability can also displace people. Issues of livability can stem from disaster as mentioned previously, but climate change is also responsible for longer term issues of habitability. Temperature and coastal erosion are the factors of paramount concern in this regard. Temperature is particularly important in regions that are already susceptible to extreme heat. This concern led to a series of studies on the future habitability in the Middle East, North Africa, and the Sahel given current climate projections for decades to come.⁵⁷ Scholars working at the Max Planck Institute published a report in 2016 that projected future daytime temperatures upwards of 50 degrees Celsius; if this turns out to be true, the habitability of the region could be permanently compromised,⁵⁸ which would require the relocation of entire population centers to areas where climate related temperature changes have not elevated to such severe levels. Sea level rises can have a similar effect, in that they represent a chronic, irreversible threat to habitability rather than an acute threat like a climate related weather event. This threat is particularly pervasive in low lying island nations in the Pacific and

⁵⁶ Hem Nalini Morzaria-Luna, Peggy Turk-Boyer, and Marcia Moreno-Baez. "Social indicators of vulnerability for fishing communities in the Northern Gulf of California, Mexico: implications for climate change." *Marine Policy* 45 (2014): 182.

⁵⁷ Anmar Frangoul, "Climate Change Could Make North Africa and Middle East 'Uninhabitable,'" *CNBC*, May 4, 2016, <https://www.cnbc.com/2016/05/04/climate-change-could-make-north-africa-and-middle-east-uninhabitable.html>.

⁵⁸ Frangoul.

Indian Oceans like Tuvalu,⁵⁹ Kiribati,⁶⁰ and the Maldives⁶¹ where sea level rise has already forced some coastal settlements to relocate further inland.

Studying Climate Change

While there is no hard division between the techniques and factors used to study climate change in the natural sciences as opposed to the social sciences, there are some distinctions between how the topic is approached by different disciplines. Much of the scientific literature focuses on how different phenomena are related to climate change whereas social scientists tend to use the knowledge generated by climate scientists to study the effects of climate change affect human societies. When it comes to these shared phenomena of interest, four of the most important climate related variables are mean temperature change, atmospheric carbon dioxide concentration, mean ice sheet area, and mean sea level rise. Some of the best global data on all of these measures are made available by NASA.

Global mean temperature is the measure most directly associated with climate change, as it is the effect that gave rise to the term global warming. NASA corroborates their data with the Climate Research Unit at the University of East Anglia (a source that is used for country level mean temperature changes) and NOAA. Their readings, which are based on mean surface temperature for the year, indicate an increase in global temperature of 0.8 degrees Celsius since 1880, with 18 of the 19 warmest years in recorded history occurring after 2001.⁶²

⁵⁹Colette Mortreux, and Jon Barnett. "Climate change, migration and adaptation in Funafuti,Tuvalu." *Global Environmental Change* 19, no. 1 (2009), 105-106.

⁶⁰ Richard Bedford, and Charlotte Bedford. "International migration and climate change: A post-Copenhagen perspective on options for Kiribati and Tuvalu." *Climate change and migration: South Pacific perspectives* 89 (2010).

⁶¹ Michael Gagain, "Climate change, sea level rise, and artificial islands: Saving the Maldives' statehood and maritime claims through the constitution of the oceans." *Colorado Journal of International Environmental Law & Policy* Volume 23 (2012): 77.

⁶² "Vital Signs," NASA, *Global Climate Change*, n.d., <https://climate.nasa.gov/vital-signs/global-temperature/>.

Whereas global mean temperature changes are a consequence of climate change, other factors like increases in atmospheric carbon dioxide concentration are responsible for causing warming trends. As mentioned previously, the major change in carbon dioxide concentration seen since 1800 has primarily resulted from human activities like industrialization. When these gases accumulate in the atmosphere, they trap heat and cause increases to the Earth's surface temperature. Prior to the industrial revolution, the atmospheric carbon dioxide concentration never rose above 300 parts per million (ppm) even during periods of naturally high carbon emissions.⁶³ Today, the current concentration stands at approximately 412 ppm and is on track to move even higher as emissions continue to climb.⁶⁴

As carbon dioxide levels rise and increase the Earth's mean surface temperature, other factors start to be affected as well. One such area is sea ice area, which has been declining as temperatures in the arctic increase. As ice area decreases, the arctic becomes even more susceptible to warming due to the decreased insulation from warming air and ocean levels rise as well. While the trend in the sea ice area varies more significantly by year than carbon dioxide concentration, the overall trend has been in decline for years with the average decline coming in at over 12 percent per decade.⁶⁵

As ice sheets melt, newly freed liquid water and icebergs freed from larger glaciers enter the ocean and cause sea level rise. Sea level rise is a destructive force in many respects, as it increases the vulnerability of coastal regions to acute disasters like hurricanes as well as longer term issues such as erosion and encroachment by the ocean onto land. NASA's satellite data indicates a rate of change of 3.3 millimeters per year, with some organizations, including the

⁶³ "Vital Signs."

⁶⁴ Ibid.

⁶⁵ Ibid.

Intergovernmental Panel on Climate Change, projecting total sea level rise of 3 feet by the end of the century.⁶⁶ An increase of this magnitude would not only be catastrophic for some of the island nations discussed previously such as the Maldives but also for low lying coastal areas around the world.

Scientists and social scientists use these climate indicators to conduct research in a number of areas. One such area of inquiry is the impact of climate change on ecological and weather phenomena. Weather effects like precipitation are fairly easy to link to climate change, as temperature increases and other climate related variables can cause systemic shifts in local weather patterns. Generally speaking, air's water capacity increases by 7% per degree Celsius of warming.⁶⁷ There is some degree of unpredictability in projecting the climate's effect on weather patterns, but most estimates trend conservative in order to account for this uncertainty. Indeed, several researchers from the Massachusetts Institute of Technology demonstrated in a 2010 study that real precipitation volume exceeded projections from the IPCC over half of the time.⁶⁸ Chronic underestimation may very well continue to be the case as models are made obsolete by changes in human activities.

Precipitation and hurricanes are not the only types of weather events that are related to climate change. One of the key impacts of climate change on local weather patterns is a push towards extremes of intensity. As Peter Slott has identified, temperature, precipitation volumes, and other weather events are being pushed towards extremes at either end of the intensity

⁶⁶ Mooney, Chris. "Scientists keep upping their projections for how much the oceans will rise this century." *Washington Post*. April 16, 2017.

⁶⁷ Kevin E. Trenberth, "Changes in precipitation with climate change." *Climate Research* 47, no. 1-2 (2011): 123124.

⁶⁸ Masahiro Sugiyama, Hideo Shiogama, and Seita Emori. "Precipitation extreme changes exceeding moisture content increases in MIROC and IPCC climate models." *Proceedings of the National Academy of Sciences* 107, no. 2 (2010): 571.

continuum (i.e. extreme heat and cold, extreme precipitation and drought).⁶⁹ Slott also identifies the fact that the increased frequency and intensity of weather disasters is also made more likely by climate change. In addition to these points, Slott discusses the emergent scientific consensus that extreme weather is specifically linked to anthropogenic factors as opposed to natural variations in climate patterns.⁷⁰

Economic and Political Consequences of Climate Change

The political consequences of climate change are complex, and the diversity of social science literature on these consequences reflects this fact. However, this diversity has also enabled an enormous breadth of scholarship even at the level of individual issues. Research into climate change's effects on agriculture and the implication of these effects for vulnerable populations is a prime example of this breadth. Scholarship on this subject has circulated for some time; Richard M. Adams published a comprehensive summary of the economic implications of climate change on agriculture in 1989,⁷¹ just one year after the creation of the IPCC. Since then, agriculture has remained an important topic in social science climate literature, as it should be considering its centrality to human life and its dependency on weather patterns in agrarian areas. Economics is also not the only field to synthesize climate change and agriculture. Emergent intersectional fields of political science like political ecology are at the forefront of this type of research. Works like Marcus Taylor's *The Political Ecology of Climate Change Adaptation: Livelihoods, agrarian change and the conflicts of development* have proven

⁶⁹ Peter Slott, "How climate change affects extreme weather events." *Science* 352, no. 6293 (2016): 1517-1518.

⁷⁰ Slott, 1517.

⁷¹ Richard M. Adams, "Global climate change and agriculture: an economic perspective." *American Journal of Agricultural Economics* 71, no. 5 (1989): 1272-1279.

invaluable in further developing understandings of the convergence of climate change and political issues like development and governance.⁷²

More broadly, economists and political scientists have built a comprehensive body of literature on climate change's relationship to economic development. Economic development is often seen as a bulwark against the worst effects of climate change, as wealthy countries are often understood to be better equipped to deal with the worst effects of climate change.⁷³ Additionally, as Samuel Fankhauser and Richard Tol have identified, underdeveloped countries and countries that experience particularly severe climate related effects are also most susceptible to economic damage.⁷⁴ These two facts point to a feedback loop of climate related economic challenges, where extant inequality is exacerbated by climate change, leaving vulnerable societies even more exposed to the worst effects of climate change. This is an important idea to consider, as the impact of climate change cannot be interpreted as monolithic. Rather, climate change interacts with political forces like inequality and underdevelopment in ways that can be complex and also highly destructive.

The notion of state capacity, or the ability of national governments to meet the material needs necessary for projects like mitigating climate change, is related to economic development. This is a less developed area of literature compared to economic issues or development, though there has been some recent progress in this regard. Research on state capacity can take a number of forms; Bruce Gilley's study of China's response to environmental concerns provides a good basis for the debate between proponents of democratic and authoritarian regimes as being better

⁷² Marcus Taylor, *The political ecology of climate change adaptation: Livelihoods, agrarian change and the conflicts of development*, Routledge, 2014.

⁷³ Alex Bowne, Sarah Cochrane, and Samuel Fankhauser, "Climate change, adaptation and economic growth," *Climatic change* 113, no. 2 (2012): 95.

⁷⁴ Samuel Fankhauser, and Richard SJ Tol. "On climate change and economic growth." *Resource and Energy Economics* 27, no. 1 (2005): 1-3.

prepared to deal with climate change.⁷⁵ Beyond the study of regime types, there are also discussions of how state capacity can lead to conflict. Though he does not draw any concrete conclusions, Idean Salehyan points out that states with lower economic and technological capacities to mobilize against the adverse effects of climate change can be more susceptible to conflict since they tend to be less capable at addressing climate related grievances.⁷⁶

However, conflict is just one way to frame the issue of security. There are several different dimensions to security, all of which are susceptible to the influence of climate change and related phenomena. John Barnett's article "Security and climate change" provides a useful introduction to thinking about the relationship between climate change and different types of security concerns.⁷⁷ In particular, he focuses on the role that climate change plays in reformulating ideas about national security as well as the possibility that climate change could spark violent conflict between or within states by way of deprivation or competition.⁷⁸

However, one of the most frequently overlooked subfields of security, human security, is perhaps the security paradigm with the closest relationship to climate change. This field treats the individual as the primary prism for understanding issues of security, and thus it tends to prioritize issues like hunger, threat of force, discrimination, and other issues pertinent to human safety rather than issues like interstate competition or the political machinations of regional blocs. Human security is also a relatively new field of inquiry within security studies; the first discussions of the topic under this name emerged in the United Nations Development

⁷⁵ Bruce Gilley, "Authoritarian environmentalism and China's response to climate change," *Environmental Politics* 21, no. 2 (2012): 287-307.

⁷⁶ Idean Salehyan, "From climate change to conflict? No consensus yet," *Journal of Peace Research* 45, no. 3 (2008): 315-326.

⁷⁷ Jon Barnett, "Security and climate change," *Global environmental change* 13, no. 1 (2003): 7-17.

⁷⁸ Barnett.

Programme's 1994 report.⁷⁹ The extension of the field to include the issue of climate change and warfare came about some time after this, but now as the interconnectedness of these issues comes into more stark relief, the body of substantive work is increasing. Perhaps the most comprehensive example of this type of work is *Climate change, human security and violent conflict: challenges for societal stability*, which deals with the intersection of these topics as well as the institutions intended to govern the issues associated with these phenomena.⁸⁰

The History of the Displacement Regime

Before discussing the way displacement is studied by social scientists, historians, and legal scholars, it is important to build an understanding of how the institutions governing displacement came into being. While they have developed to a certain extent over time, the institutions themselves have been fundamentally unchanged since the end of the Second World War (with the exception of the passage of the 1967 Protocol Relating to the Status of Refugees).⁸¹

The modern refugee regime cannot be discussed without tracing the modern history of humanitarian law. The first modern codified agreement on the topic was the First Geneva Convention, which was ratified in 1864 and has since its inception been overseen by the International Committee of the Red Cross (ICRC).⁸² While this law was revised on a number of occasions and supplemented with the adoption of additional Geneva Conventions, the modern versions of these laws were ratified in 1949 and extended to include protections for troops at sea,

⁷⁹ "Human Development Report 1994" (United Nations Development Programme, 1994), http://hdr.undp.org/sites/default/files/reports/255/hdr_1994_en_complete_nostats.pdf.

⁸⁰ Jürgen Scheffran, Michael Brzoska, Hans Günter Brauch, Peter Michael Link, and Janpeter Schilling, eds, *Climate change, human security and violent conflict: challenges for societal stability*, Vol. 8. Springer Science & Business Media, 2012.

⁸¹ "States Parties to the 1951 Convention Relating to the Status of Refugees and the 1967 Protocol" (United Nations High Commissioner for Refugees, n.d.), <https://www.unhcr.org/protect/PROTECTION/3b73b0d63.pdf>.

⁸² "Convention for the Amelioration of the Condition of the Wounded in Armies in the Field. Geneva" (International Committee of the Red Cross, August 22, 1864), <https://ihl-databases.icrc.org/ihl/INTRO/120>.

prisoners of war, and civilians.⁸³ The four Geneva Conventions were later supplemented by three Additional Protocols intended to offer further protections than those enumerated in the original four conventions.⁸⁴

While these laws afford some protections to civilians, and despite the best efforts of Fridtjof Nansen, the High Commissioner for Refugees under the League of Nations, to provide some semblance of order to persons displaced during and after the First World War and its related conflicts,⁸⁵ there were no permanent bodies specifically intended to address the needs of displaced populations prior to the end of the Second World War. With the creation of the United Nations, it became possible to address the mass displacement experienced after the end of the war and the division of Europe through international governance, though this was not without difficulty.

The first organization established to address the needs of refugees was the United Nations Relief and Rehabilitation Administration (UNRRA), which was created in 1943 to address the needs of refugees displaced during the Second World War.⁸⁶ The organization was replaced by the International Refugee Organization (IRO) in 1946 as a way expanding provisions and care for refugees whose needs had not been met under the supervision of the UNRWA.⁸⁷ The IRO was subsequently reorganized into the UNHCR in 1950 with the intention of limiting the temporal mandate for the body's refugee organization to only cover refugees of the Second

⁸³ "The Geneva Conventions of 1949 and Their Additional Protocols," *International Committee of the Red Cross*, October 29, 2010, <https://www.icrc.org/en/doc/war-and-law/treaties-customary-law/geneva-conventions/overview-geneva-conventions.htm>.

⁸⁴ "The Geneva Conventions of 1949 and Their Additional Protocols."

⁸⁵ "Fridtjof Nansen Biographical," n.d., <https://www.nobelprize.org/prizes/peace/1922/nansen/biographical/>.

⁸⁶ Grace Fox, "The Origins of UNRRA." *Political Science Quarterly* 65, no. 4 (1950): 561-584, https://www.jstor.org/stable/2145664?seq=1#page_scan_tab_contents, 564.

⁸⁷ "UN Charter CHAPTER III PRIVILEGES AND IMMUNITIES, DIPLOMATIC AND CONSULAR RELATIONS, ETC" (United Nations Treaty Collection, n.d.), https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=III-2-10&chapter=3&clang=_en.

World War.⁸⁸ A separate body, the UNRWA, was established the same year to address the needs of Palestinian refugees expelled during the Nakba at the end of the First Arab-Israeli War.⁸⁹ As it became clear that a permanent organization was needed, the United Nations passed the 1951 Convention Relating to the Status of Refugees as a means of expanding the UNHCR's mandate.

However, there were problems with the language used in the 1951 convention that made it inapplicable for situations after the Second World War.⁹⁰ It quickly became clear that displacement was a continuing phenomenon, and so a follow-up convention was adopted in 1967 that expanded the purview of the UNHCR to deal with other conflicts.⁹¹ This proved essential to the survivability of the regime in the long term, as Cold War conflicts and wars of national liberation in the global south caused significant displacement of people in need of help but who would not have met the standard of official refugee status under the old convention.⁹²

Definitions Within Displacement

One of the issues vital to understanding displacement is how different groups are legally distinguished. Each of these definitions applies to a different set of conditions and confers different legal protections. As a result, the semantics here are important, which is why throughout prior parts of this paper terms like displacement are used as catch-all terms to imply some degree of forced movement from an area of origin.

⁸⁸ "History of UNHCR," *UNHCR*, n.d., <https://www.unhcr.org/en-us/history-of-unhcr.html>.

⁸⁹ Ricardoc Bocco, ed., "UNRWA AND THE PALESTINIAN REFUGEES: A HISTORY WITHIN HISTORY," *Refugee Survey Quarterly* 28, no. 2 & 3 (2010), <https://www.unrwa.org/userfiles/201006109359.pdf>, 229-230.

⁹⁰ The original convention only applied to persons in Europe who had been displaced as a result of violence or persecution during the Second World War, which excluded displaced persons in Asia as well as those who were forced into displacement after 1945.

⁹¹ "Convention and Protocol Relating to the Status of Refugees," (United Nations High Commissioner for Refugees, 1967), <https://www.unhcr.org/3b66c2aa10.html>.

⁹² The reason for this distinction will be discussed in detail in the next section, which deals with the legal definitions used by the UNHCR and the rights conferred on each category.

Despite the fact that the term refugee is frequently used to describe any forcibly displaced person, the term has specific legal definition based on the situation that causes a displaced person to move. Before the changes made by the 1967 Convention, the term refugee was constrained even more narrowly, as it was intended only to apply to displaced persons in the European theater of the Second World War. The original legal definition of the word was someone who:

As a result of events occurring before 1 January 1951 and owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it.⁹³

After the passage of the 1967 convention, the language was changed so as to nullify the temporal constraints placed on the definition. Additionally, states were at first given the choice to consider only refugees from the European context or all refugees of the Second World War, though this was also amended in 1967.⁹⁴ Article 33 of the treaty also provides the legal basis for the principle of non-refoulement, which prevents countries from unwillingly returning refugees to their country of origin. The responsibility of non-refoulement is defined by The UNHCR as:

No Contracting State shall expel or return (“refouler”) a refugee in any manner whatsoever to the frontiers of territories where his life or freedom would be threatened on account of his race, religion, nationality, membership of a particular social group or political opinion.⁹⁵

This principle is intended to prevent national governments from forcibly returning refugees to a potentially dangerous country of origin, though in practice this has provided some states with the

⁹³ “Convention and Protocol Relating to the Status of Refugees” (United Nations High Commissioner for Refugees, 1951), <https://www.unhcr.org/4ae57b489.pdf>.

⁹⁴ “Convention and Protocol Relating to the Status of Refugees,” (1967).

⁹⁵ “Note on Non-Refoulement (Submitted by the High Commissioner) Note on Non-Refoulement (Submitted by the High Commissioner) EC/SCP/2,” *UNHCR*, August 23, 1977, <https://www.unhcr.org/en-us/excom/scip/3ae68ccd10/note-non-refoulement-submitted-high-commissioner.html>.

perverse incentive to prevent the arrival of refugees in the first place. This issue has become particularly glaring in the Mediterranean, where European Union (EU) member states have begun financing a militia calling itself the Libyan Coast Guard to prevent migrants and refugees from reaching Europe.⁹⁶

Whereas refugees have the legal right to protection based on fear of persecution or displacement resulting from war, other categories of people do not enjoy these privileges universally. Asylum seekers are one of the few categories that do to some extent,⁹⁷ as Article 14 of the Universal Declaration of Human Rights enumerates the right of all people to seek asylum from persecution in their home country. However, displaced persons beyond the context of war and persecution who crossed an international border have no legal regime that was designed to meet their needs. In practice, this means that stateless people, people in a refugee-like situation, disaster-induced migrants, and internally displaced people (IDPs) all exist beyond the framework of the UNHCR's refugee regime.⁹⁸ A summary of the legal rights afforded to different categories of displaced persons is outlined in the chart below:

⁹⁶ Patrick Wintour, "UN accuses Libyan linked to EU-funded coastguard of people trafficking," *The Guardian*, June 8, 2018, <https://www.theguardian.com/world/2018/jun/08/un-accuses-libyan-linked-to-eu-funded-coastguard-of-people-trafficking>.

⁹⁷ "Asylum-seekers are 'individuals who have sought international protection and whose claims for refugee status have not yet been determined.'"

"Forced Migration or Displacement," *Migration Data Portal* (blog), October 25, 2019, <https://migrationdataportal.org/themes/forced-migration-or-displacement>.

⁹⁸ "It is estimated that at least 10 million people are stateless worldwide: they are not considered as nationals by any State under the operation of its law...Statelessness can be caused by a number of factors such as: discrimination in nationality laws (e.g. racial, religious or gender), conflict between and gaps in nationality laws and State succession. Being undocumented is not the same as being stateless. However, lack of birth registration can put people at risk of statelessness as a birth certificate provides proof of where a person was born and parentage – key information needed to establish a nationality. Risks of statelessness can also arise in situations of displacement."

"What Is Statelessness?" (United Nations High Commissioner for Refugees, n.d.), <https://www.unhcr.org/ibelong/wp-content/uploads/UNHCR-Statelessness-2pager-ENG.pdf>.

"Persons in a refugee-like situation includes 'groups of persons who are outside their country or territory of origin and who face protection risks similar to those of refugees, but for whom refugee status has, for practical or other reasons, not been ascertained.'"

Figure 2.2: Categories of Displaced Persons and Their Respective Rights Under International Law

Category	Rights
Refugee	Full legal protection (non-refoulement, provision of care, protection of UNHCR/UNRWA)
Asylum Seeker	Same protections as refugees (pending assessment of asylum application)
Internally Displaced Person	Protected by the laws of their home country and potentially the refugee regime if displaced by war or persecution, but no specific additional protections
Person in Refugee-Like Situation	No specific legal protection
Stateless Persons	No specific legal protection, and no benefits of citizenship

“Forced Migration or Displacement.”

“Disaster-induced migration is the displacement of people as a result of ‘a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses or impacts, which exceeds the ability of the affected community or society to cope using its own resources.’”

Ibid.

“Internally displaced persons (IDPs) are defined as ‘persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border.’”

Ibid.

The consequence of this is that regardless of the norms of conduct that members of the international community may feel pressure to abide by, there is no international legal basis for the protection of displaced persons beyond war refugees and asylum seekers.

In theory, both groups could be linked in some way to climate change, particularly war refugees. However, even if there was overlap between climate displacement and war displacement, victims of displacement only have rights as war refugees, as the category of climate refugee only exists in academic and policy circles. There is no legal category of an economic migrant, disaster displacement, or other form of displacement that can be linked to climate change. Therefore, barring cases of climate related war or environmentally related persecution, such as the violence against members of the Ogoni and Igbo tribes in the Niger Delta,⁹⁹ there is no legal regime that provides protections for people vulnerable to the effects of climate change.

Studying Displacement

Scholarship engaged with issues of displacement can be roughly divided into two categories. The first, and more closely related category to the previous discussion, is scholarship dealing with how refugees are categorized and other critiques of the current legal regime for displaced persons, especially in regard to climate related displacement. The second deals with the empirical study of different instances of displacement. The line between these categories is often blurry, especially when scholars from either discipline engage with work from those on the other side. Nonetheless, the delineation is useful because it helps to parse the legal literature from the study of movement in the context of the social sciences, both of which are integral to this project.

⁹⁹ “Update on Human Rights Violations in the Niger Delta,” *Human Rights Watch*, December 14, 2000, <https://www.hrw.org/news/2000/12/14/update-human-rights-violations-niger-delta>.

Not all of the work on this topic comes from academic sources, as national governments and intergovernmental organizations are acutely aware of the difficulties posed by this issue. The European Parliament took up this issue in its recent session. As an area that has had extensive firsthand experience coping with and governing the influx of displaced persons over the course of the past five years, the European Union has become acutely aware of the risk climate change poses for exacerbating displacement despite their limited efforts to address the problem. In a working paper authored by Joanna Apap, an argument for a regional enshrinement of the concept of a climate refugee is advanced.¹⁰⁰ While it is not clear what the parameters for this category would be, it offers a useful start for conceptualizing how this issue can be framed from a governance standpoint. Additionally, militaries are also planning to incorporate displacement modeling into their understanding of how to operate. For example, Commander Daniel White, a U.S. Naval Officer proposed a novel training tool, what he terms a “Peace Game” in order to familiarize military planners with how to address displacement in Security Force Assistance and Security Cooperation operations.¹⁰¹

National governments have raised similar concerns. The British government’s *Foresight* publication¹⁰² attempted to forecast the future difficulties of climate displacement, as well as the responsibility of the British government in mitigating this issue. It has also been the topic of scholarly analysis as well; Richard Black, Stephen R. G. Bennet, Sandy M. Thomas, and John R. Bennington’s paper “Migration as adaptation,” includes useful analysis of the report.¹⁰³ The

¹⁰⁰ Joanna Apap, “The concept of ‘climate refugee’: Towards a possible definition,” *European Parliament* (February 2019), [https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI\(2018\)621893](https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2018)621893).

¹⁰¹ Daniel White, “THE PEACE GAME: A DATA-DRIVEN EVALUATION OF A SOFTWARE-BASED MODEL OF THE EFFECTS OF MODERN CONFLICT ON POPULATIONS,” *Naval Postgraduate School*, September, 2015, xvi.

¹⁰² “Migration and Global Environmental Change: Future Challenges and Opportunities,” *Government Office for Sciences Foresight Programme* (2011), <https://www.gov.uk/government/collections/foresight-projects>.

¹⁰³ Richard Black, Stephen R. G. Bennet, Sandy M. Thomas, and John R. Bennington, “Migration as adaptation,” *Nature* 478 (2011), 447.

paper recognizes some of the conventional assumptions about climate change and migration, but also offers important insights into the difference between migration and displacement. It points out that most often migration is undertaken by those with the material means to leave their current circumstances, and as a result, voluntary migration can actually decrease in cases of emergency such as the 1983-1985 droughts in Mali.¹⁰⁴ This complicates the notion that emergencies invariably lead to displacement, as some of the most vulnerable people lack the material means to escape imminent danger.

Legal scholars have also taken up the study of this issue. In their article for the *Harvard Environmental Law Review*, Bonnie Docherty and Tyler Gianni propose a convention to frame the legal rights of climate refugees.¹⁰⁵ The paper describes what climate change displacement looks like and what it may become, both of which are necessary for any attempt to amend the international refugee regime. However, as a good portion of the paper is speculative and more of a policy proposal than a true analysis of the problem, it serves as a better guide to shaping potential governance solutions than as analysis of the issue as it exists currently. Additionally, the paper also only classifies refugees as people that cross borders¹⁰⁶, and thus fails to account for internally displaced people and others in refugee-like situations, many of whom have their displacement event grounded in the effects of anthropogenic climate change. Other legal scholars like Paramjit S. Jaswal and Stellina Jolly have provided more legal analysis than policy prescriptions on the topic, though both are useful for this investigation.¹⁰⁷

¹⁰⁴ Black, 447-448.

¹⁰⁵ Bonnie Docherty and Tyler Giannini. *Confronting a Rising Tide: A Proposal for a Convention on Climate Change Refugees*, *Harvard Environmental Law Review* no. 349 (2009).

¹⁰⁶ Docherty.

¹⁰⁷ Paramjit S. Jaswal and Stellina Jolly. *Climate refugees: challenges and Opportunities for international law*. *Journal of the Indian Law Institute* 55, no. 1 (2013): 45-58.

More traditional social science works on migration are also necessary in order to understand approaches to studying displacement. One useful article in conceptualizing how scholars study modern instances of displacement is Clark Gray, Elizabeth Frankenberg, Thomas Gillespie, Cecep Sumantri, and Duncan Thomas' work studying displacement after the 2004 Indian Ocean Tsunami.¹⁰⁸ Their approach combines both qualitative and quantitative research on the disaster, including population surveys, satellite data analysis, and statistical tools to address the issues of displacement and vulnerability from multiple angles. Their research not only demonstrates the utility of different approaches to studying displacement, but it also shows how causal relationships surrounding disaster-related displacement can be confounded by the interaction of covariates. For example, socio-economic status has traditionally been treated as a predictor for fleeing a disaster, but this research demonstrates there is not always a clear causal relationship between economic vulnerability and displacement.¹⁰⁹

Colette Mortreux and Jon Barnett's article on migration as a form of climate mitigation in Tuvalu is a classic example of a political science case study on a particular response to climate change.¹¹⁰ The paper explores a particularly prominent group of potential climate refugees, residents of coastal villages in Tuvalu. However, far from confirming the hypothesis that climate induced sea-level rise will necessarily cause migration en masse from vulnerable islands, the paper cites the stated opinions of residents of Tuvalu's main island, many of whom wish to stay.¹¹¹ This raises questions of direct attribution of climate change to desire to migrate and also questions the assumption that the threat of climate induced disaster elicits only one response. It

¹⁰⁸ Clark Gray, Elizabeth Frankenberg, Thomas Gillespie, Cecep Sumantri, and Duncan Thomas. "Studying displacement after a disaster using large-scale survey methods: Sumatra After the 2004 tsunami." *Annals of the Association of American Geographers* 104, no. 3 (2014): 594-612.

¹⁰⁹ "Studying displacement after a disaster using large-scale survey methods: Sumatra After the 2004 tsunami."

¹¹⁰ Mortreux.

¹¹¹ Ibid.

also highlights the possibility that the mere threat of danger may not be sufficient motivation to move, and that displacement tends to be a product of material forces rather than the threat of their future damage.

Finally, some scholars dedicated to the study of humanitarianism have focused on different models of response to disasters and other crises. Scholarship on disaster planning and response is not new, and has for decades utilized scholarship from political science, sociology, public health, and epidemiology to study modes of identifying and addressing acute human security issues like natural disasters.¹¹² More recently, considering the realization that refugee displacements often last well past the end of a disaster, scholars are beginning to develop alternative conceptions of humanitarian response. Some displacements can last years, such as the current displacement from Syria,¹¹³ and other last decades, such as the displacement of Palestinians from the Nakba and the 1967 occupation of the West Bank.¹¹⁴

While these two examples do not stem from climate change (or they only do so partially in the case of Syria), they do highlight the fact that displacement is not a fleeting concern. Because of the intractability of many instances of displacement, a new model of humanitarian response has emerged. Termed the “resiliency model,” this mode of response considers both the short-term emergency requirements of a disaster as well as the enduring challenges of displacement, under provision of essential resources, and governance of displaced populations. Suzan Ilcan and Kim Rygiel discuss this model in depth in their article “*Resiliency Humanitarianism*”: *Responsibilizing Refugees through Humanitarian Emergency Governance in*

¹¹² Joseph F. Waeckerle, "Disaster planning and response," *New England Journal of Medicine* 324, no. 12 (1991): 815-821.

¹¹³ “Seven Years On: Timeline of the Syria Crisis,” *UNHCR*, March 7, 2018, <https://www.unhcr.org/ph/13427-seven-years-timeline-syria-crisis.html>.

¹¹⁴ “UNRWA AND THE PALESTINIAN REFUGEES: A HISTORY WITHIN HISTORY.”

the Camp, which also posits refugee camp self-governance as a possible way of addressing enduring challenges.¹¹⁵

Testable Implications

Climate change and displacement are both classic examples of collective action problems. While there are strong normative and collective benefits to working towards solutions to these issues, they require short term financial and political sacrifice on the part of individual states. While intergovernmental organizations like the United Nations are technically capable of governing these issues, they require states to consent to external governance and the partial abrogation of their sovereignty. This is not an easy issue to get around, and even individual agreements on climate change and the treatment of refugees have been limited in scope by the intransigence of individual member states. As the United States' withdrawal from the Paris Agreement demonstrated, a single state acting on an ulterior political motivation can prevent or limit the efficacy of collective action by the rest of the community of nations. While coupling studying these issues in conjunction may not address this particular issue, it does introduce the possibility of examining policy solutions that serve multiple purposes and potentially provides motivation for pursuing substantive changes to the climate governance and displacement regimes. While neither issue has been sufficient to motivate meaningful change, they may provide such motivation for each other, thereby creating a situation in which the consequences of climate change may be governed by the displacement regime or displacement is worked into the international system of environmental regulation.

However, for the time being the international community does not have functioning climate or displacement governance. Faced with the potential for increased levels of

¹¹⁵ Suzan Ilcan and Kim Rygiel, "'Resiliency humanitarianism': responsabilizing refugees through humanitarian emergency governance in the camp," *International Political Sociology* 9, no. 4 (2015): 333-351.

displacement and an unresponsive, inflexible legal regime that was never intended to deal with displacement outside of the context of war or persecution, the possibility of mass climate related displacement creating a humanitarian disaster for vulnerable populations the world over is not difficult to conceptualize. Because climatic events like the Dust Bowl can facilitate mass displacement, and since climate change is increasing the frequency of these episodes, it stands to reason that a relationship between climate change and displacement exists. This view is uncontroversial within the international community,¹¹⁶ and since climate change is an existing problem rather than an emergent one, it seems possible that climate change played some role in displacements in the recent past. The legal regime governing displacement was not created with the implications of climate change (or any other phenomenon for that matter). Because of this, it is necessary to think about how climate related displacement functions before formulating the models necessary to study historical climate displacement.

Based on the possible relationships explored in this chapter, there are several testable implications that should be present if climate change has the relationship to climate change that I expect it does. First, the most basic criteria are that climate change and displacement correlate with each other. This relationship is easy to assess. As the global mean temperature (or the regional equivalent) increases, we should see the total population of displaced persons increase. Conversely, if the mean temperature decreases, then the population of displaced persons should decline. However, since it has been established that climate change is getting worse and that the planet's mean temperature is increasing, we should see the total displaced population growing.

Second, if there is an unmediated, linear relationship between climate change and displacement, we should see higher levels of displacement in regions that demonstrate more

¹¹⁶ Barney Thompson, "Climate Change and Displacement," UNHCR, October 19, 2019, <https://www.unhcr.org/en-us/news/stories/2019/10/5da5e18c4/climate-change-and-displacement.html>.

severe climate change effects. Since climate change can manifest itself differently across the globe, we would expect that areas affected more by climate change would have more displaced persons than those with comparatively less severe climate change. Temperature deviation is used as the primary climate indicator for this project for regional and global analysis. Because of this, this testable implication is examined in terms of temperature change. For example, if Region X has a temperature deviation of 2.0 degrees Celsius and Region Y has a temperature deviation of 0.5 degrees Celsius, we should expect Region X to have comparatively more displacement than Region Y.

Third, displacement is likely to be different in cases of conflict though all forms should be positively correlated with displacement. In general, the impact of climate change on displacement should be higher in cases where conflict is present because war can create more pressing issues of human security than those presented by climate change. However, this relationship may be complicated to a certain extent if war begins because of climate related stressors. While the exact issues associated with this complication are likely impossible to parse, a method for dealing with it is introduced in the final models. Additionally, though three types of conflict are accounted for in the QoG dataset (international, internal, and internationalized internal conflict) there should not be a significant difference between these types of war in terms of their relationship to climate change. If any differences emerge, this would likely be because of regional differences in the distribution of each mode of conflict. When war is accounted for by means other than climate change, the amount of displacement attributable to climate change should be lower than in cases where climate change causes conflict.

Fourth, the non-conflict control variables should all be correlated positively displacement since each of these variables represent an additional stressor pushing a country towards

displacement. Like the conflict variables, the impact of climate change on displacement should be lower in cases where these variables factor more heavily into displacement. Like the conflict variables, these variables can have complicated causal relationships with climate change, which can make it difficult if not impossible to determine which cases are climate related and which cases are not. To resolve this, a similar method is employed in the final models is applied to conflict.

Finally, the last two models are constructed as a “best case scenario” and a “worst case scenario.” In the “best case” model, all the moderating factors (conflict, economic decline, etc.) is treated as causally independent from climate change. This enables me to understand what the base level of displacement attributable to climate change is. The second model or “worst case” model represents a case in which all the control variables are caused by climate change, and thus treats all displacement from these factors as ultimately the result of climate change. While neither of these models pretends to model the actual causal relationship between climate change and displacement, they help to provide a high and low estimate of the impact of climate change on displacement. Therefore, it helps to solve the issue of parsing the causal relationship between climate change and displacement by creating a range of potential impacts.

Chapter III: Methodology, Data, and Research Design

Rains recently have been very intense – very intense... We don't want to leave our land: here are our past, our memories, our ancestors. We don't want to move to other parts, we don't know what to do there. We would turn into delinquents. We'd enter into a cycle of poverty which happens in the cities.¹¹⁷

Octavio Rodriguez
Farmer, Sucre, Colombia

¹¹⁷ Elizabeth Blunt, “Climate-induced migration creates perils, possibilities,” *The New Humanitarian*, January 20, 2014, <http://www.thenewhumanitarian.org/feature/2014/01/20/climate-induced-migration-creates-perils-possibilities>.

Datasets

There are two datasets that undergird my analysis in this project. The first of these is the dataset made available by the UNHCR, which documents several different vulnerable populations.¹¹⁸ The unit of analysis for this project is the country-year. This unit is derived from the structure of this dataset, as refugee populations are classified based on their country of origin, the recipient country, and the year. However, the country of origin is ultimately more important than the recipient country since the purpose of this study focuses more on why people flee rather than why they choose to go where they do. In addition to these variables, the UNHCR Dataset includes the number of displaced persons, the population type (refugee, IDP, etc.), and a number of other indicators that I added to the dataset in order to provide controls to determine climate change's role in creating displacement events. More information on these variables, including the sources used for these data, is provided later in this chapter.

My analysis begins in 1992 when the UNHCR started subdividing displaced persons into categories based on their circumstances.¹¹⁹ These categories are not based on the cause or duration of their displacement, but rather on the geopolitical circumstances of their displacement. The categories are determined by whether a displaced person crossed an international border and to a certain extent their reasons for doing so. While the categories introduced in 1992 is explained in greater detail along with the other variables later in this chapter, for now it is more important to identify the importance of this year as far as the data are concerned.

Additionally, the decision to use 1992 as a starting year because of the structure of the UNHCR data has important consequences for this study. Specifically, it renders study of the years prior to 1992 impossible across all groups of displaced persons, which significantly limits

¹¹⁸ "Population Statistics," *UNHCR*, 2018, <http://popstats.unhcr.org/en/overview>.

¹¹⁹ "Population Statistics."

the scope of the project. Nonetheless, the acceleration of climate change over the past three decades should make it possible to analyze its impact on displacement despite the temporal constraints imposed by the UNHCR's coding changes.

The other major dataset that I use for this project is the University of Gothenburg's Quality of Governance (QoG) dataset.¹²⁰ The time series dataset published by the University of Gothenburg contains hundreds of different variables related to governance issues as well as a codebook that explains each one in detail. Not all the variables documented by the QoG dataset are relevant for this project, as many if not most are unrelated to issues of climate change or displacement. However, those that are used are described in detail later in this chapter.

As in the case of the UNHCR dataset, QoG's time series does not provide comprehensive data for all variables in all years. Indeed, for several important variables relevant to this project, data is only available as far back as 2005.¹²¹ Unlike in the case of the UNHCR dataset, this temporal limitation is borne of lack of data rather than a reclassification of existing data. This limitation is somewhat more problematic than the one imposed by the UNHCR reclassification, because it means that many of these variables are only useful for the years 2005-2017 or in some cases 2005-2015. Therefore, while these variables are useful for greater descriptive depth over a narrow stretch of time, they cannot be used as controls in models that use data from years prior to 2005.

Primary Outcome: Displaced Person Categories

¹²⁰ "QoG Standard Data," *The Quality of Governance Institute at the University of Gothenburg*, January 31, 2019, <https://qog.pol.gu.se/data/datadownloads/qogstandarddata>.

¹²¹ Jan Teorell, Stefan Dahlberg, Sören Holmberg, Bo Rothstein, Natalia Alvarado Pachon & Richard Svensson, "QoG Standard Data Codebook," *The Quality of Governance Institute at the University of Gothenburg*, 2019, https://www.qogdata.pol.gu.se/data/qog_std_jan19.pdf.

The primary outcome variable for this project is the number of displaced persons. The UNHCR dataset contains five different categories of displaced persons, some of which have specific legal protections that were discussed in the previous chapter's examination of the international refugee regime. Additionally, the dataset provides for some additional categories, which, while pertinent to the staff at UNHCR are not relevant for a study on climate induced displacement. These categories include returned refugees, returned internally displaced persons (RIDPs), others of concern, and stateless persons. The reason for excluding returned refugees and RIDPs is mostly due to the focus of the project; it intends to study the causes of displacement, not the factors that induce return to a country from which someone previously fled.

Statelessness is excluded because while it is possible for stateless persons to be displaced, they are not accounted for because of displacement. Rather, the figures reported by the UNHCR are intended to account for known cases of people who are not recognized as citizens of any country.¹²² In cases like the Rohingya in Myanmar and Bangladesh, the denial or revocation of statelessness can result in displacement because it helps to excuse systematic discrimination and violence in the minds of some policy makers.¹²³ However, other cases of statelessness have a less clear relationship to displacement. The Modi administration's recent decision to deny the citizenship of Assamese Muslims in India has not yet resulted in displacement, though the possibility of future displacement exists.¹²⁴ Therefore, because this indicator tracks the condition of statelessness rather than its cause, it cannot be accurately utilized in my analysis.

¹²² "UNHCR Statistical Online Population Database: Sources, Methods and Data Considerations," *UNHCR*, January 1, 2013, <https://www.unhcr.org/statistics/country/45c06c662/unhcr-statistical-online-population-database-sources-methods-data-considerations.html#stateless>.

¹²³ "Rohingya Refugee Crisis," *UNHCR*, 2020, <https://www.unrefugees.org/emergencies/rohingya/>.

¹²⁴ Namrata Kolacham, "India's Great Disenfranchisement," *Slate*, August 9, 2019, <https://slate.com/news-and-politics/2019/08/india-nrc-assam-modi-muslims-citizens.html>.

In this project, I defined displaced persons as refugees, IDPs, people in refugee-like situations, and asylum seekers. Each of these groups represent mobile, displaced populations, which means they could have been influenced in some way by climate change to abandon their homes in order to seek protection. However, there are important distinctions between these groups that need to be noted. In order to determine what these differences are, I turn to the UNHCR's definition for each group and explain any implications for what we see in the data.

As explored in Chapter 1, refugees have the broadest legal protections afforded to them. However, these legal protections and the legal status of "refugee" are connected to specific circumstances. Legally, a refugee is only legally recognizable as such if they have been displaced through discrimination or violence, such as in war or during the commission of a genocide.¹²⁵ Initially, it would seem that this is at odds with the idea of climate induced displacement. However, when how climate change can influence factors including war, it is possible that those fleeing violence or persecution are fleeing the results of climate change, albeit for different reasons than those who flee climate induced natural disasters. Because of this, refugees are an important population to consider when looking at climate related displacement.

Asylum seekers share similar legal protections to refugees, as they are essentially refugees in waiting or "pre-refugees." An asylum seeker is someone who has not yet been given the legal status of refugee but is nonetheless applying for such protections.¹²⁶ Under international law, national governments must provide the same protections to asylum seekers as they do to refugees, though in practice both groups have received spotty protections. For example, recent groups of asylum seekers from Central America have been detained in the U.S. or deported to other countries while awaiting the processing of their asylum claims in possible violation of non-

¹²⁵ "UNHCR Statistical Online Population Database: Sources, Methods and Data Considerations."

¹²⁶ Ibid.

refoulement.¹²⁷ However, as in the case of refugees, climate change can potentially act as a causal factor leading to displacement despite the fact that their legal protections are predicated on the notion of displacement due to violence or persecution. Additionally, because asylum seekers are in the process of applying for official refugee status, it is possible that they are not fleeing violence or persecution and are instead using the asylum application process to seek safety from other threats, potentially including climate induced threats.

Internally displaced persons are something of a special case because their category does not provide any information about the legal protections afforded to them. Whereas refugees and asylum seekers have specific legal protections under international and national law, IDPs need not have any protection, though they may be entitled to them depending on the reason for their displacement.¹²⁸ The category of IDP instead refers to any displaced person who never crosses an international border as a result of their displacement. In some cases, this type of displacement could be the result of internal political or conflict factors, such as those displaced on the Philippine island of Mindanao as a result of the Moro Insurgency.¹²⁹ However, IDPs could also be displaced by climate related factors. Acute ecological stressors like storms and more chronic stressors such as droughts can both contribute to internal displacement, and since there are no specific conditions that define official IDP status, climate could play into internal displacement either directly or indirectly.

There are two separate categories in the data for individuals in refugee-like situations and others of concern. Until 2007, most individuals in refugee-like situations were classified in the

¹²⁷ Jeff Abbott, "U.S. Deportations of Guatemalans Doubled Over the Past Decade," *Yahoo News/Reuters*, January 3, 2020, <https://news.yahoo.com/u-deportations-guatemalans-doubled-over-203142988.html>.

¹²⁸ "UNHCR Statistical Online Population Database: Sources, Methods and Data Considerations."

¹²⁹ EJ Roque, "PRRD: BARMM 'realization' of Moro dreams and end armed struggle," *PTV News*, February 22, 2019, <https://www.ptvnews.ph/prrd-barmm-realization-of-moro-dreams-and-end-armed-struggle/>.

category of others of concern, though some were also listed with the refugee category.¹³⁰ These two categories serve as catch all terms for those under UNHCR stewardship. Unlike an unknown category or a catch-all for any unclassifiable case, these individuals have been displaced but the circumstances of their displacement and the legal protections they are entitled to are unclear. Nonetheless, they fall under the aegis of the UNHCR and as displaced persons they are also important to consider when examining the role of climate change in displacement.

While legally distinct categories, each group could be responding to either the direct or indirect effects of climate change. Of the groups counted in the data, IDPs are perhaps the most likely to be displaced by the direct effects of climate change since not all of them are *de jure* refugees. Because of this, some could be victims of natural disaster or long-term climatic changes that have forced them to abandon their homes without leaving their country of origin. While refugees could have been displaced by climate change in an indirect manner, their legal status means that they faced the threat of persecution or violence at the hands of a human party. Additionally, the refugee-like displaced persons and others of concern have no identifying qualities that help to understand how they came to be displaced. While it is possible they faced either direct or indirect displacement due to climate change, there is no way to know for sure whether or not they did so based on the available data.

Key Predictors: Climate Change Related Variables

This project relies on data from NASA and the University of East Anglia (UEA) to measure several different climate variables. These variables are used along with data on displacement in order to establish the range. The most important of these is mean temperature,

¹³⁰ “UNHCR Statistical Online Population Database: Sources, Methods and Data Considerations.”

which is commonly used to express the degree of the severity of climate change. There are two temperature variables that I added to the UNHCR dataset, one for global mean temperature based on NASA data and one for country level mean temperature, which is based on UEA's data. While the UEA's data is potentially more valuable for understanding localized instances of climate related displacement because temperature changes are not homogenous across the surface of the Earth, the NASA global temperature data are still important because of the impact of global temperature on some of the other climate change variables used in this project. These variables are used in conjunction with data on displacement to create descriptive models of the relationship between key consequences of climate change and displacement. Temperature is particularly important in this regard because it is the primary means by which anthropogenic factors such as greenhouse gas emissions are transformed into forces that materially impact human wellbeing.

One of the direct consequences of global temperature increases is the decline of arctic and Antarctic ice areas. September is most frequently the time when ice sheets hit their area minimum in the arctic and is therefore conventionally used as a date for measuring ice sheet area. As temperature increases, the minimum ice area decreases as ice chunks break off from larger glaciers or turn to liquid water. While ice area plays relatively little role in influencing displacement, one of the consequences of ice melt can have profound consequences for vulnerable coastal populations. Sea level rise can be impacted by melting ice sheets, leading to coastal soil erosion, flooding, and heightened vulnerability to the effects of coastal storms.

While sea level like temperature varies globally due to irregularities in the Earth's gravitational field, taking this variable to a national level is not particularly useful unless one is able to account for factors such as coastal elevation, water depth, and other niche environmental

criteria that affect how sea level rise affects states.¹³¹ Additionally, the problems of global sea level readings also exist at the national level, albeit on a smaller scale. Coastlines are not uniform within states or even within ecosystems, and as such the process of decreasing the scale of measurement would become a runaway project in reductionism rather than a meaningful way to more accurately show the texture of coastal environments.

Finally, as a major source of warming, atmospheric carbon dioxide concentration is also an important measure of climate change. CO₂ and other so-called “greenhouse gases” contribute to global warming by trapping heat within the Earth’s atmosphere, thus resulting in an increase in global surface temperatures. This effect compounds as the concentration of CO₂ and other gases increase, leading to an increased rate of warming in addition to the higher mean temperature. As in the case of ice melt, CO₂ levels are not relevant as a cause of displacement, but they are important for understanding the causes of climate change and how the rate of climate change can increase over time.

Moderating Factors: Country-Level Variables

There are a number of country-level variables included in the QoG dataset, as well as some that I introduced to the UNHCR dataset in order to control for factors that did not have comparable indicators in the QoG data. The section that follows explains the methodology and rationale for the inclusion of each variable in the datasets.

The first country level variable is the “War01” binary indicator. This variable is coded as a 0 or 1, with 0 indicating the absence of armed conflict in a country of origin and a 1 indicating an active war in that country for that year. This variable was manually input into the UNHCR

¹³¹ “Earth’s Gravity Field and Sea Level,” *The Massachusetts Institute of Technology*, https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-808-introduction-to-observational-physical-oceanography-fall-2004/lecture-notes/course_notes_3b.pdf.

dataset, as there is no equivalent in the UNHCR or QoG data. In some papers, war tends to be defined in terms of hitting a certain casualty threshold. However, since casualties or intensity of fighting are not necessarily reflective of the capacity for displacement, any form of armed insurgency, conflict, or other form of violence is classified as a “1” for the purposes of this variable. This variable is of paramount importance as well; since war can induce displacement absent of a climate stressor, it is an important control variable when looking at climate change’s impact on displacement. Additionally, since war can be induced in part by climate change, it can also be used in models for testing the upper threshold of climate induced displacement.

The UNHCR dataset also includes a manually input country freedom score based on the scores provided by Freedom House. This variable has two different forms, one for the country of origin and one for the recipient country, both of which change by year. This variable is intended as a control for cases of displacement caused by the condition of political freedom in a given country. Freedom House is not a perfect source for this type of information, as Freedom House has a close relationship with the United States government and has been criticized by a number of observers for bias or methodological shortcomings in the past.¹³² Additionally, since Freedom House’s *Freedom in the World* ranking evaluates political liberties rather than positive views of freedom. As such, countries where the citizenry is legally allowed to engage in politics but are constrained from doing so by material deprivation are considered free, whereas countries with greater material wellbeing but fewer legal protections for civil liberties are considered less free. While this is in keeping with the emphasis on negative freedom emphasized in countries like the

¹³² Nils Steiner, “Testing for a Political Bias in Freedom House Democracy Scores: Are U.S. Friendly States Judged to be more Democratic?” *Journal of Comparative Policy Analysis*, August 13, 2012, https://www.academia.edu/5869279/Testing_for_a_Political_Bias_in_Freedom_House_Democracy_Scores_Are_U.S._Friendly_States_Judged_to_be_more_Democratic.

“Freedom in the World 2019,” *Freedom House*, 2019, <https://freedomhouse.org/report/freedom-world/freedom-world-2019/democracy-in-retreat>.

U.S., there is some debate as to the utility of judging freedom solely on this basis. Nonetheless, the Freedom House ranking remains important because the same ranking is used by the QoG dataset, albeit in a truncated form. There is no effective alternative to this ranking that provides the necessary temporal and geographic scope that a political freedom indicator needs to provide for this project.

The first of the QoG variables included in this project is termed “Demographic Pressure” by the authors of the dataset.¹³³ This variable is used to describe the pressure on a population caused by the government’s inability to respond to a number of factors, specifically those “related to natural disasters, disease, environment, pollution, food scarcity, malnutrition, water scarcity, population growth, youth bulge, [and] mortality.”¹³⁴ Because these factors are related to state capacity in addition to population pressures, this variable is a composite of two classes of factors that can lead to displacement. Also, because it includes environmental pressures on the population, this variable is a useful control for environmentally related displacement resulting from factors other than climate change.

QoG also provides an “Economic Decline” indicator.¹³⁵ This variable is a composite of a number of economic factors, including measured by “per capita income, Gross National Product, unemployment rates, inflation, productivity, debt, poverty levels, business failures... sudden drops in commodity prices, trade revenue, or foreign investment, and any collapse or devaluation of the national currency.”¹³⁶ Since the economic condition of a country can play an important role in the ability of the citizenry to live within its borders, economic factors have the potential to influence displacement events. This variable is useful for controlling for cases of displacement

¹³³ “QoG Standard Data Codebook.”

¹³⁴ Ibid.

¹³⁵ Ibid.

¹³⁶ Ibid.

resulting from economic stressors rather than climate change, and since some instances of economic decline are partially traceable to climate change, it can also be used to model the upper threshold for climate related displacement.

Building on the theme of economic hardship, the “Uneven Economic Development” variable provides a means of controlling for displacement caused by inequality of development.¹³⁷ Since the gains of economic expansion are not always felt equally across all sectors of society, it is possible for some elements of society to feel economic hardship despite overall improvement of a country’s economic situation. This variable builds on measures of inequality such as the GINI coefficient and includes measures such as the “income share of highest 10%, income share of lowest 10%, urban-rural service distribution, access to improved services, [and] slum population to determine the degree of inequality in a country’s national economy.”¹³⁸ In doing so, this variable helps to control for a potential cause of economic related displacement in cases where an outwardly strong economy could hide economic stressors leading to displacement.

Related to “Economic Decline,” “War01,” and “Demographic Pressure” is the “External Intervention” variable.¹³⁹ This variable covers instances when an external national, international, or nongovernmental power intervenes in some aspect of a government’s normal function. External interventions come in a variety of forms, including “foreign assistance, presence of peacekeepers, presence of UN missions, foreign military intervention, sanctions, [and] credit rating.”¹⁴⁰ While many of these factors may not lead to displacement directly, the presence of an external intervention could indicate the existence of one or more stressors within a country that

¹³⁷ Ibid.

¹³⁸ Ibid.

¹³⁹ Ibid.

¹⁴⁰ Ibid.

could cause displacement. Because of this, the variable is potentially useful in controlling for causes of displacement that would not otherwise be accounted for.

QoG also provides a syncretic variable that pulls from a total of twelve different variables, including from a number of the indicators listed above. This variable, the “Fragile State Index,” provides a numerical score from 0 to 120, with 0 representing perfect governance and stability and 120 representing the complete breakdown of government.¹⁴¹ As a composite of many different variables, it is not particularly useful at targeting any one factor related to displacement. However, because it provides a numerical score that sums up the susceptibility of a particular state to a number of different governance factors, it provides a versatile and comprehensive catch-all (or most) variable for controlling for the economic and governance factors that can induce displacement. The other categories of stressors not directly accounted for in the Index are conflict and environmental factors (climate related or otherwise).

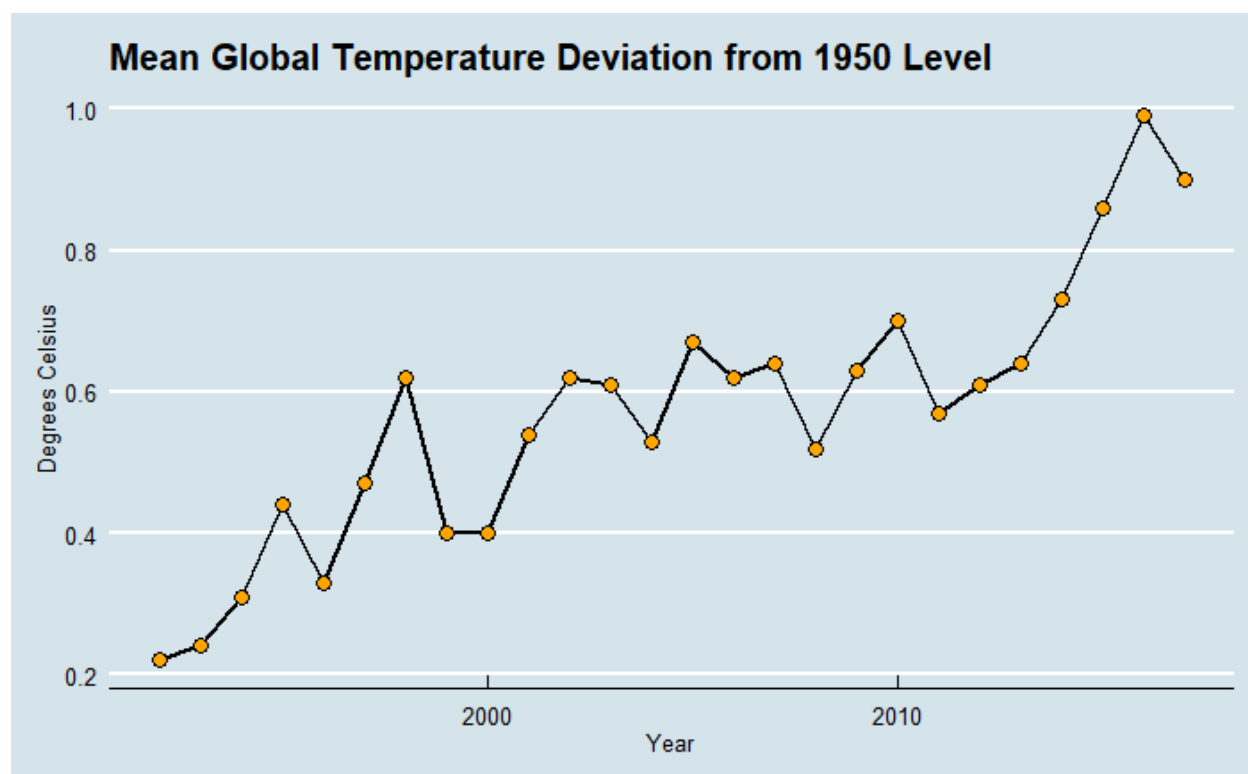
Descriptive Figures and Statistics

Before addressing the research design element of this project, it is important to look at the data themselves to see how they are structured and to understand some of the important trends within them. These figures include visualizations of current trends in climate change, the relationship between CO₂ emissions and global mean temperature rise, global displacement trends, and regional climate and displacement information.

First, Figure 3.1 illustrates the trend in global climate change in the period covered by this project:

Figure 3.1

¹⁴¹ Ibid.



Data from UNHCR Dataset and NASA Climate Data; Figure by Author¹⁴²

Note that for this chart, the Mean Temperature Deviation is measured in degrees Celsius, and each tick mark on the y-axis represents an elapsed period of five years. As mentioned in the title of this figure, the temperature deviation indicated is relative to the mean global temperature in the year 1950 (i.e. the Earth was approximately 0.9 degrees Celsius warmer in 2017 than it was in 1950). As mentioned previously in this chapter, the level of warming is not homogenous across the Earth, which makes sense given that regional climate is determined by a number of factors, including air and ocean currents, latitude, distance from large bodies of water, and other factors. However, as a gauge of the state of global warming, global mean temperature provides a useful way of visualizing how drastically the planet's climate has changed in the past thirty

¹⁴² "Vital Signs," NASA.

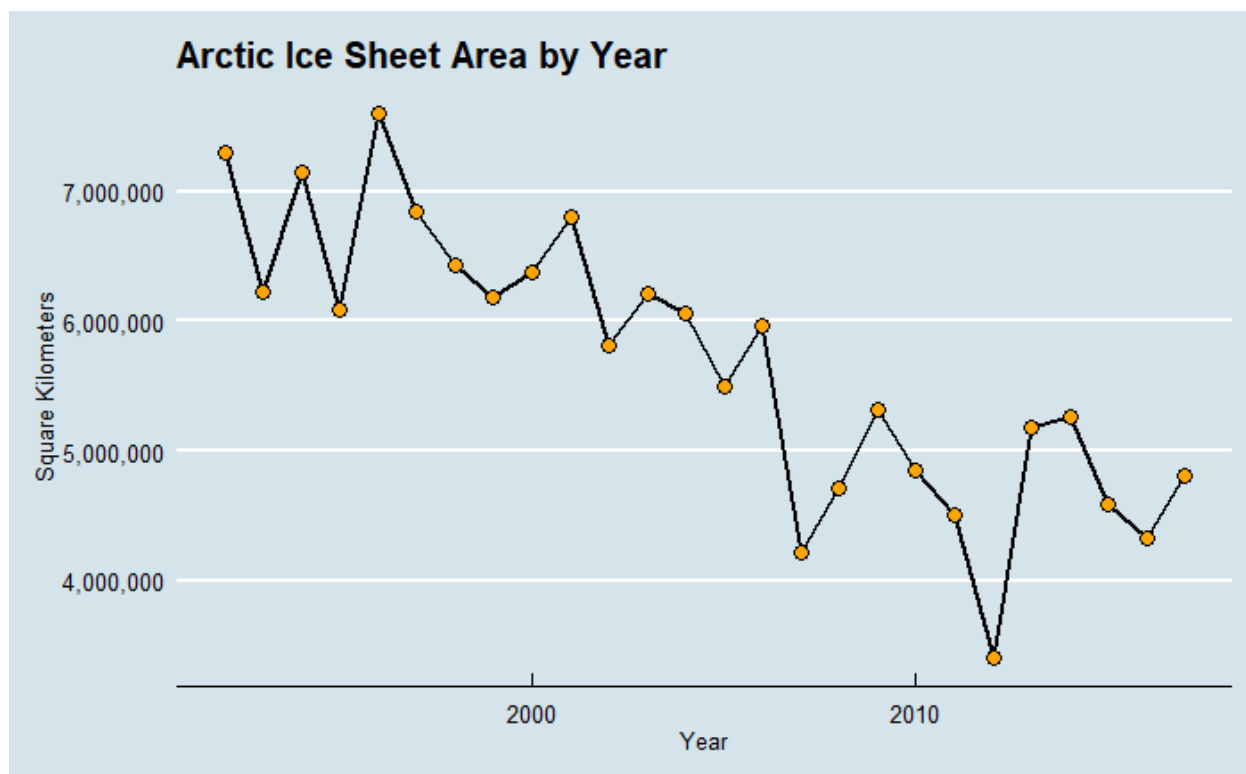
"UNHCR Statistics," *United Nations High Commissioner for Refugees*.

years. Additionally, at 0.9 degrees of warming, the Earth is already nearly two-thirds of the way to reaching the 1.5-degree Celsius warming limit set by the Paris Climate Accord. Climate analysts at the United Nations have hypothesized that above this level of warming, the Earth would see the permanent extinction of most species of coral as well as a further increase in the frequency and severity of heat waves, coastal flooding, hurricanes, and other climate related weather phenomena. These same analysts have estimated that with the current pace of warming, humanity has approximately twelve years to reverse the warming trend or else the planet will exceed the threshold of 1.5 degrees Celsius.

The effects of the current level of warming are already visible around the world. The damage to the ecosystems and threat of climate related weather events mentioned in the UN IPCC's analysis of the current threat of climate change is a current threat, not a potential future. This threat is expected to grow worse as warming increases, which has dangerous implications for vulnerable communities.¹⁴³ One of the most pressing concerns for vulnerable coastal communities is sea level rise, which is caused largely by the melting of ice sheets in the polar regions. The current state of the Arctic ice sheet and the impact of climate change on the ice sheets are explored in Figure 3.2:

Figure 3.2:

¹⁴³ Jonathan Watts, "We have 12 years to limit climate change catastrophe, warns UN," *The Guardian*, October 8, 2018, <https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report>.



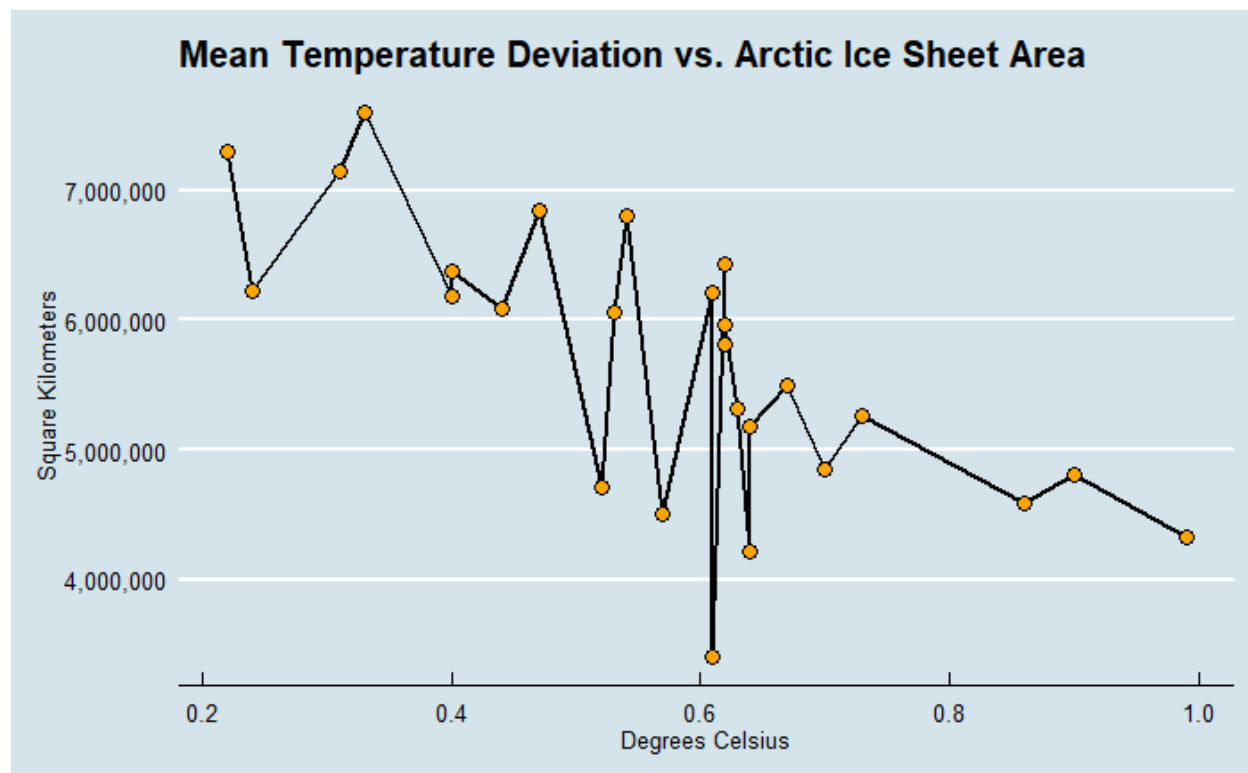
Data from NASA Climate Data; Figure by Author¹⁴⁴

Note that the ice area listed in the above figure is taken from a reading in September of each year, which is conventionally understood to be when the ice sheets in the Arctic reach their minimum area. The ice area listed on the y-axis is measured in square kilometers and each tick mark on the x-axis represents an elapsed period of five years. Over the course of the period covered by this project, the minimum ice sheet area decreased from over 7 million square kilometers to just under 5 million square kilometers, with considerable variation in the area between years. The ice sheet area hit its absolute minimum in 2013, when the total area dropped below 3.5 million square kilometers. Some of this appears to be due to the fluctuations in warming each year. Though global temperature deviation is an imperfect representation of what the localized warming experienced by the arctic is, since the NASA and UEA data do not

¹⁴⁴ "Vital Signs," NASA.

provide regional data for the Arctic, the global deviation provides the best means of understanding how the ice sheet responds to increases in global temperature. This relationship is explored below in Figure 3.3:

Figure 3.3.



Data from NASA Climate Data; Figure by Author¹⁴⁵

As in Figure 6, the ice area listed in the above figure is taken from a reading in September of each year when the ice sheets in the Arctic reach their minimum area. The ice area listed on the y-axis is measured in square kilometers and each tick mark on the x-axis represents an elapsed period of five years. The maximum temperature deviation from 1950 mean global temperature is approximately 1 degree Celsius, an increase of approximately 0.8 degrees over the smallest temperature deviation from the 1950 mean global temperature, which according to Figure 5

¹⁴⁵ Ibid.

occurred in 1992. As the global mean temperature increased from a deviation of 0.2 degrees to 1 degree Celsius, the ice sheet area in September declined by approximately 3 million square kilometers. Should this rate of change continue, as the global mean temperature increases to 2 degrees of warming above 1950 levels the minimum Arctic ice sheet area should be expected to decline to under 1.5 million square kilometers.

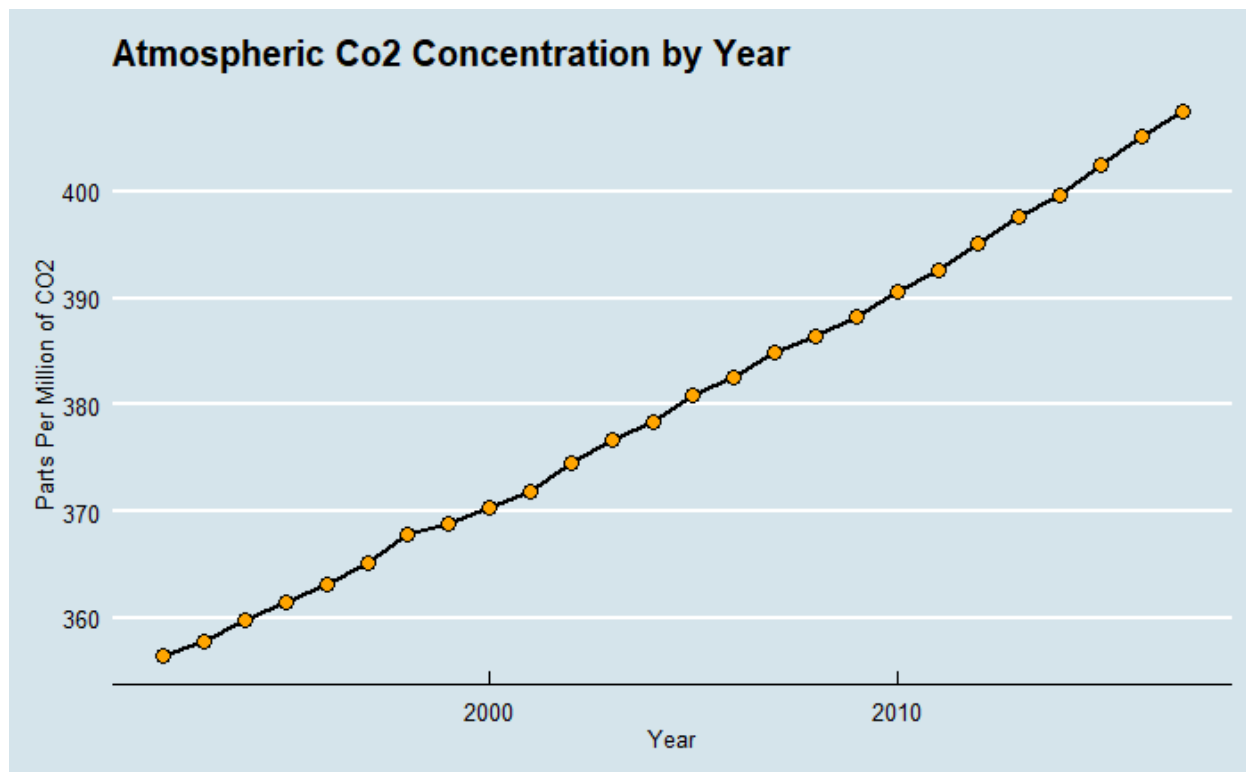
The key cause of this change in temperature and the subsequent decline in Arctic ice sheet levels is the release of greenhouse gases, particularly carbon dioxide, as a result of human activity. While there are non-anthropogenic (human related) sources of greenhouse gas emissions, for decades the scientific consensus has been that contemporary climate change is driven by human emissions.¹⁴⁶ Indeed, evidence that human greenhouse gas emissions could raise the planet's temperature appeared in newspaper clippings as early as 1912, and a recent study by NASA indicated that climate change may have been contributing to drought conditions around the world as early as 1900.¹⁴⁷ While it is difficult to measure carbon emissions directly, the consequences of the emissions can be measured. One of the most common ways of expressing the level of carbon emitted is the annual atmospheric carbon dioxide level recorded by NASA.

Figure 3.4:

¹⁴⁶ Ibid.

¹⁴⁷ Alex Kasprak, "Did a 1912 Newspaper Article Predict Global Warming?" *Snopes*, October 18, 2016, <https://www.snopes.com/fact-check/1912-article-global-warming/>.

"Evidence of man-made climate change identified starting as early as 1900," *Engineering and Technology*, May 2, 2019, <https://eandt.theiet.org/content/articles/2019/05/evidence-of-man-made-climate-change-identified-starting-as-early-as-1900/>.



Data from NASA Climate Data; Figure by Author¹⁴⁸

Note that in this figure, the atmospheric carbon dioxide concentration is reported on the y-axis in units of parts per million (PPM) and each tick mark on the x-axis represents an elapsed period of five years. The concentration of carbon dioxide in the atmosphere follows a nearly perfect linear trajectory, increasing from just above 355 ppm in 1992 to just under 410 ppm in 2017.

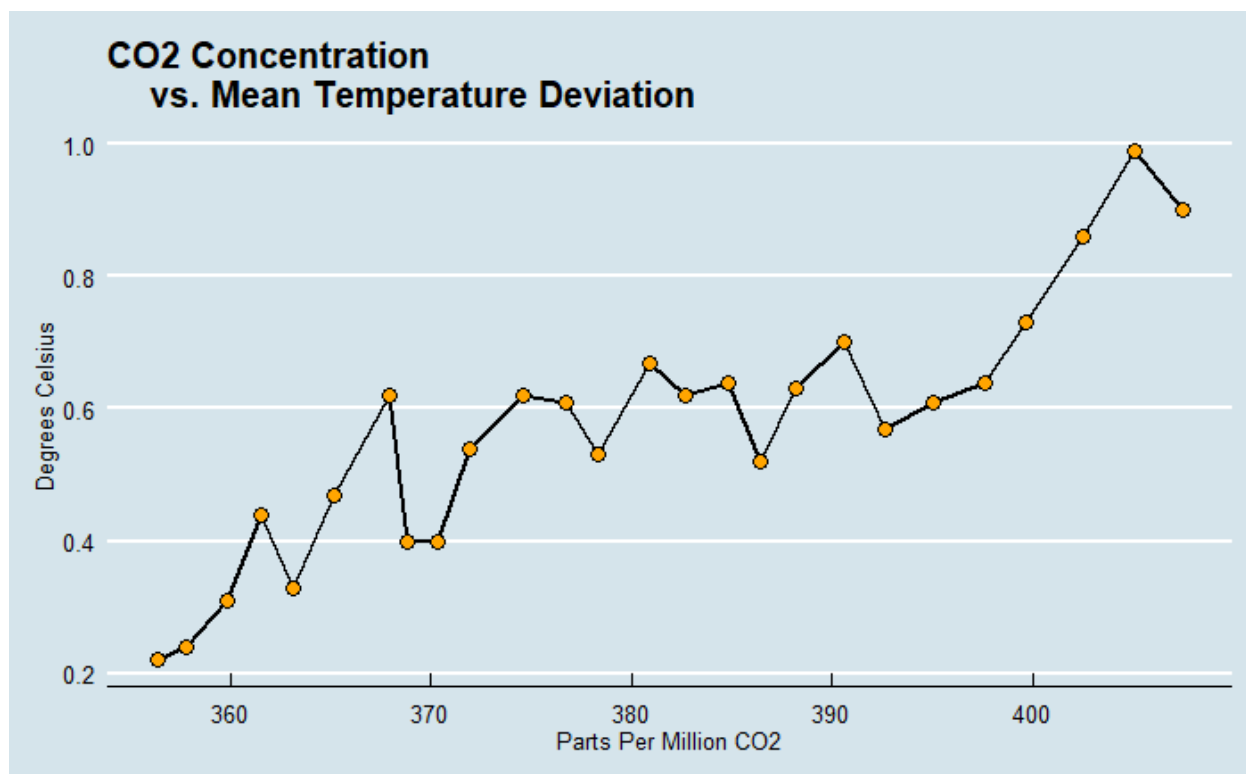
Famously, the United Nations Framework Convention on Climate Change posited that in order to prevent a tipping point in the global climate system that would result in irreversible damage to the planet, the atmospheric climate carbon concentration must be kept below a level of 350 ppm (which inspired environmental activist Bill McKibben to name his organization 350.org).¹⁴⁹

¹⁴⁸ "Vital Signs," NASA.

¹⁴⁹ Bill McKibben, "The Tipping Point," *Yale Environment 360*, June 2, 2008, https://e360.yale.edu/features/the_tipping_point.

The relationship between the concentration of carbon dioxide in the atmosphere is fairly direct; because the increase in carbon concentration has been almost perfectly linear over the period evaluated in this project, the graph relating carbon dioxide concentration to global mean temperature is nearly identical to the graph of global mean temperature deviation. This relationship is illustrated in Figure 3.5:

Figure 3.5



Data from NASA Climate Data; Figure by Author¹⁵⁰

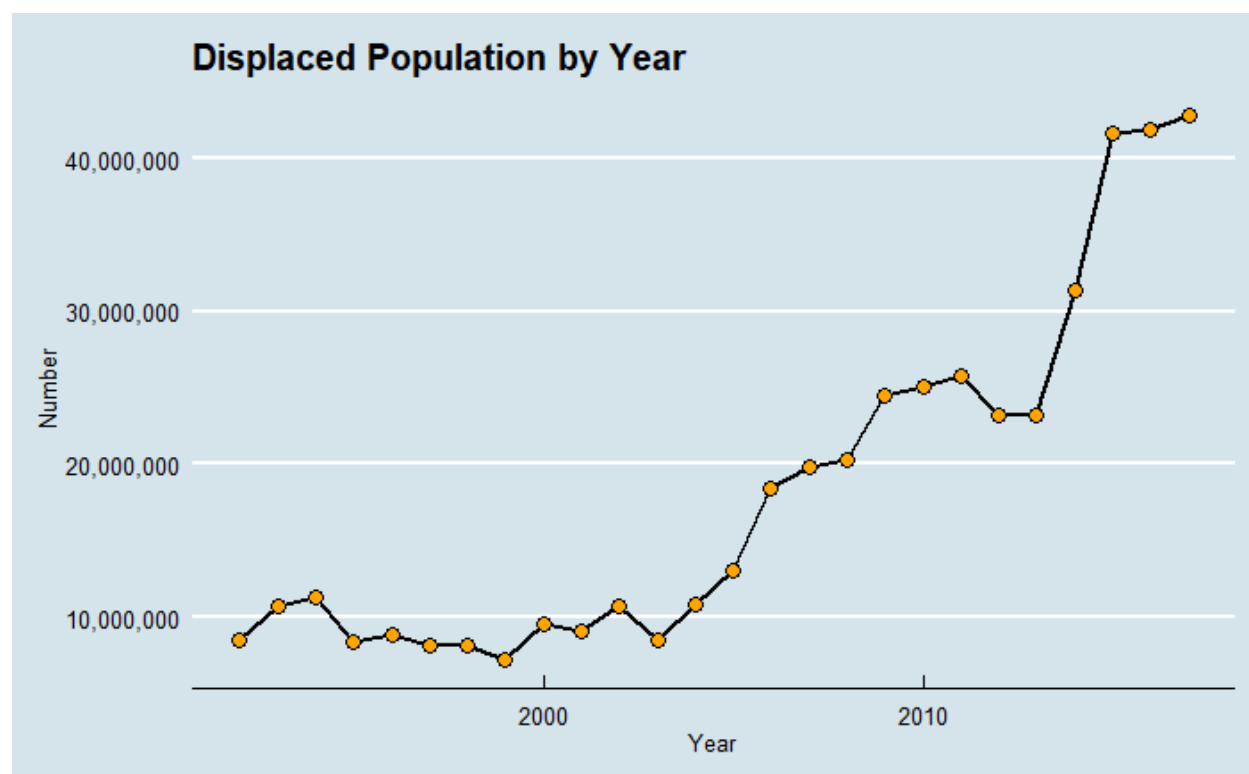
Note that in this figure, the y-axis lists the mean global temperature deviation is measured in degrees Celsius above the global mean temperature for the year 1950 and the x-axis is measured in parts per million of carbon dioxide. The rise in global temperature tracks almost directly with

¹⁵⁰ "Vital Signs," NASA.

the increase in atmospheric carbon dioxide, which is in keeping with the scientific consensus on climate change regarding the role of human activity in causing changes in global temperature.

Beyond the climate variables, global displacement statistics are also vital for understanding this project. The global population of displaced persons by year is illustrated in Figure 3.6:

Figure 3.6



Data from UNHCR Dataset; Figure by Author¹⁵¹

Note that in the figure above, each mark on the y-axis represents 5 million displaced persons, whereas on the x-axis each mark represents an elapsed period of 5 years. In 1992, a year after the end of the Cold War and the first year for which the UNHCR began separately documenting categories of displaced persons beyond refugees, the displaced population under the purview of

¹⁵¹ “UNHCR Statistics,” *United Nations High Commissioner for Refugees*.

the UNHCR stood at just under 8.5 million. By 2017, this figure had nearly quadrupled to nearly 43 million displaced persons (the global displaced population is significantly higher, but not all displaced persons fall under the UNHCR's aegis). Because the entirety of this period falls after the UNHCR's reclassification of data, the increase cannot be ascribed to changes in methodology. Additionally, since the Earth's population increased by 36% over this period, the rate of increase in the displaced population has significantly outstripped population growth. This indicates that one or more causal factors are contributing to increasing the frequency of displacement around the world.

Research Design

The unit analysis for this project is the country-year, or the origin country in a given year. The primary outcome for this project is the number of displaced persons moving from one country to another in a given year, which can be represented by refugees, IDPs, asylum seekers, others of concern, and people in refugee like situations. This variable is expressed in terms of the number of displaced people moving from the country of origin to the recipient country. The primary predictor for the model is the mean temperature deviation for a country in a given year, which is taken from the UEA data for national mean temperature deviation from 1950 levels. Temperature is a good measure for the impact of climate change because it is central to many of the relationships between climate change and displacement. Therefore, when measuring climate change's impact on displacement, using a common effect of climate change with widespread consequences for displacement is an effective means of studying the relationship. The primary predictor is expressed in terms of degrees Celsius in deviation from the mean temperature of a particular nation, region, or the planet in 1950. Since the primary outcome for the project is not dichotomous but rather an integer representing the number of displaced people moving from one

country to another in a given year, I use Ordinary Least Squares regression (OLS) in my analysis. Because of the complexity of the relationship between displacement and climate change, as well as the possible intervening variables, I fit several different linear models that have different numbers of control variables depending on their time availability. Additionally, I break the models into two distinct groups, one based on national data for individual countries and one based on regionally clustered data. The national data is used to construct the global models, which account for displacement in every observed nation. The purpose of the regionally clustered models is to determine if there is any variation between the relationship between climate change and displacement globally as opposed to in specific regions. Since some regions experience climate change differently and since other displacement stressors are not evenly distributed, regional clustering makes a more granular analysis possible while still controlling for national-level differences. As I explore later, given the fact that the regional displacement patterns explored in Figures 4.1 to 4.3 differed so dramatically, it is possible that the relationship between climate change related phenomena and displacement differ on a regional basis.

The most general of these models simply addresses the relationship between temperature deviation resulting from climate change and the overall level of displacement in a particular area. For these models, the variable representing the number of people displaced (“Number”) is regressed on the global or regional mean temperature deviation variable depending on whether it is the global or regional model. These models can cover the entire period of 1992-2017 because none of the covariates used are limited in their bounds in the same way that many of the QoG variables are. This also makes them the most general models, as they do not account for any of the factors covered by the control variables from the UNHCR or QoG datasets. The primary purpose of these models is to establish whether or not there is any discernible relationship

between climate change and displacement before moving on to more complex models that control for alternative causes of displacement.

The next models also be separated into a global model and regionally clustered models but include those controls for which data is available for all the years from 1992-2018. These models are intended to help parse whether the displacement seen globally and in different regions is the result of climate change or other causal factors. However, this process is somewhat complicated by the difficulty of assessing the causal relationship between climate change and other factors that can result in displacement. For example, climate change can create conditions that lead to war but it is nearly impossible to determine the degree to which climate change is responsible for every instance of conflict. Because of this, how would we know whether to treat a binary indicator for war (such as the one that was added to the UNHCR dataset) as a covariate distinct from the effects of climate change or as an intermediary variable that causes displacement but results from climate related phenomena? Since it is likely impossible to determine which wars were caused by climate change and the degree to which climate change is responsible, I fit two separate models to compensate. These models represent a “low” and a “high” estimate for the effects of climate change related displacement. The low estimate accounts only for the displacement associated directly by effects of climate change such as an increase in global or regional temperature. The high estimate treats all the intervening factors that *could* result from climate change, such as war, as completely caused by climate change. The effect of these dual models is not to create a single model that correctly assesses the degree to which climate change is responsible for displacement, but instead to assess the lower and upper bounds of climate change’s impact on global and regional displacement.

The final set of models follow essentially the same organization as the previous group. The primary difference is that these models are temporally restricted to the period 2005-2015 in order to utilize the variables provided by the QoG dataset. The setup of the models is otherwise be the same, as there are a set of global models and a set of regionally clustered models each of which also have a low and high estimation version. While these models do not have the scope of the pervious group, the ability to draw from other variables may confer an explanatory advantage in the smaller timespan of 2005 to 2015. If this is the case, it may help to assess the validity of some of the other models even if the QoG variables cannot be controlled for directly over the time maximum time span covered by the project.

In addition to these OLS regressions, I also create a series of descriptive models that are designed to unpack the trends within the data that are glossed over by simple linear regressions. These help to explain any seeming inconsistencies I encounter as well as to test elements of the outcomes listed at the end of Chapter II. While these models may not address causality in a manner akin to the OLS regressions, they help to parse the results in a way that cannot be achieved with OLS regressions alone.

Chapter IV: Large-N Data

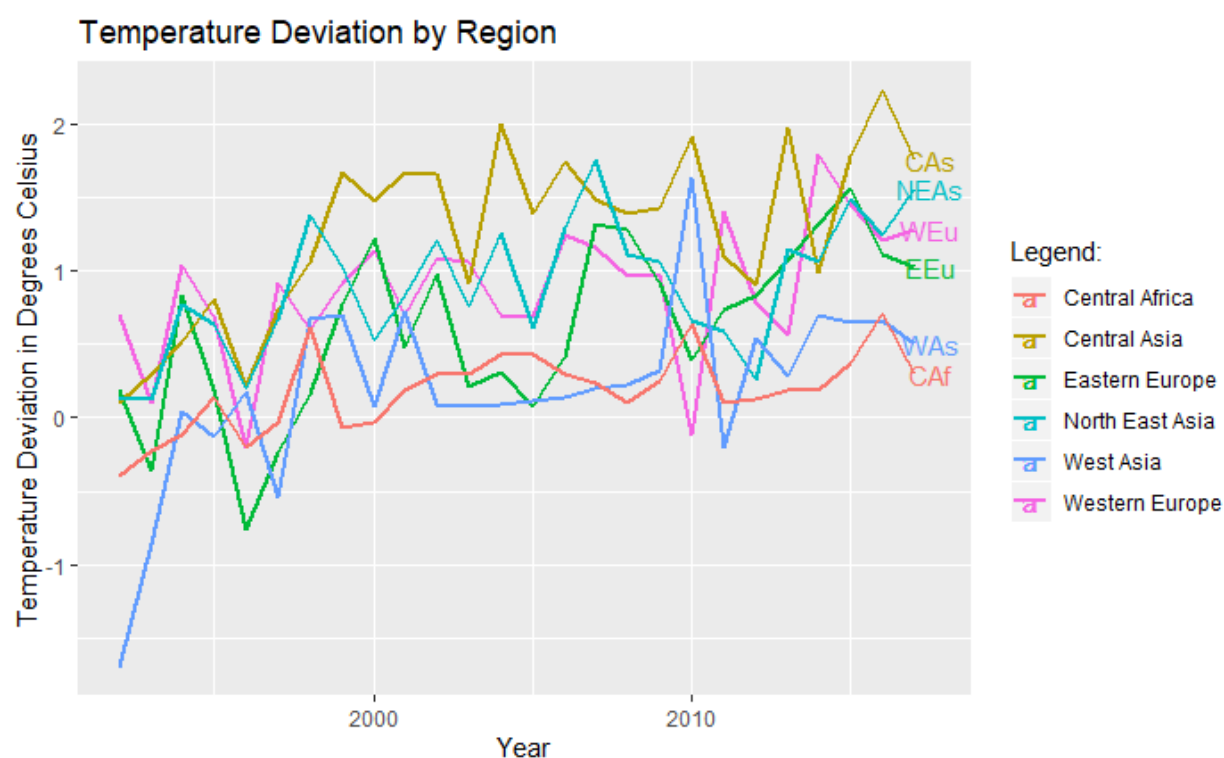
The world and its leaders can no longer pretend that increasingly shattering catastrophes like Hurricane Irma are some kind of accident or coincidence. There is absolutely no doubt that climate change is real and it's triggering the full extent of nature's fury. How much more destruction do we need to act? Rising ocean temperatures are likely to result in hurricanes with greater intensity.¹⁵²

Antonio Guterres
Secretary General of the U.N.

¹⁵² Antonio Guterres, "Hurricane Maria in Quotes and Pictures," *CaribbeanIntelligence*, <https://www.caribbeanintelligence.com/content/hurricane-maria-quotes-and-pictures>.

As discussed previously, global temperature and displacement statistics do not reveal the full complexity of the forces involved in both climate change and displacement. There are considerable national and regional level variations in climate change and displacement that help to unpack some of the intricacies and challenges of studying the intersection of these phenomena. While it is difficult to diagram these effects together in a coherent way at the level of the nation state, breaking up the analysis by region helps to illustrate some of the global variations in temperature increase and displacement flows. Figure 4.1 examines a sample of the regional variations in mean temperature deviation from 1950 levels:

Figure 4.1

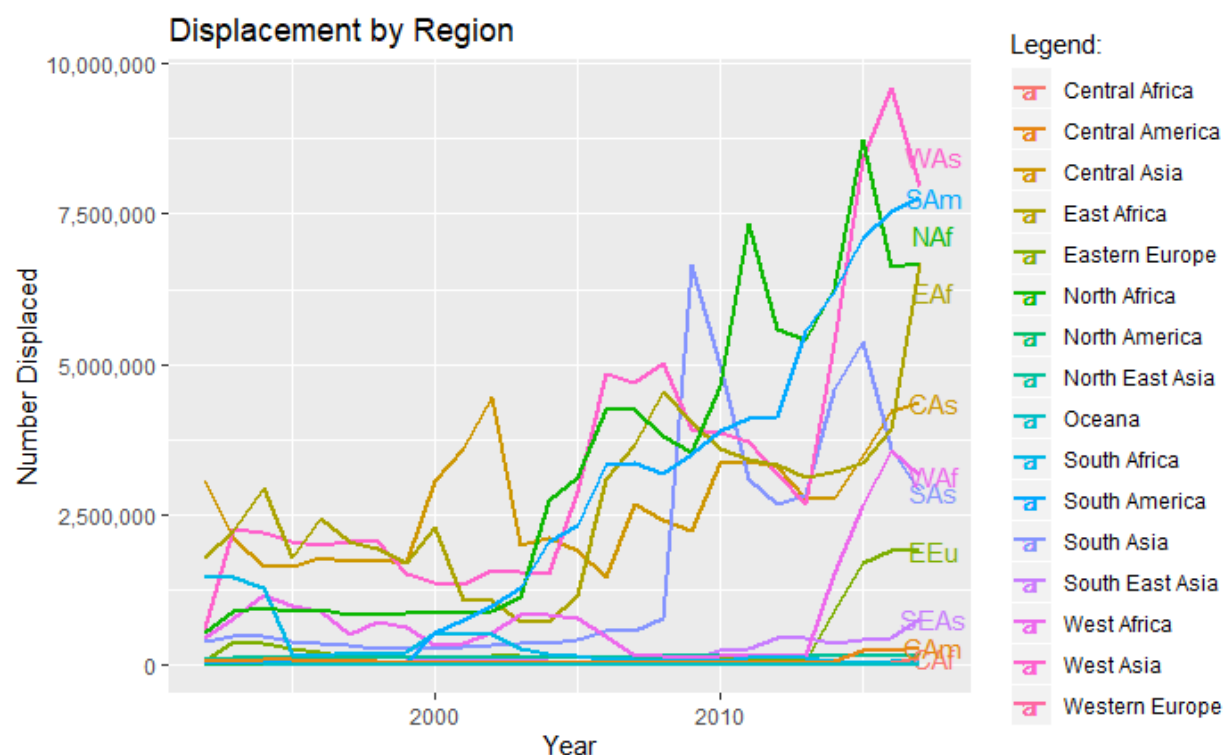


Data from University of East Anglia Climate Research Unit; Figure by Author¹⁵³

¹⁵³ "Data," *Climate Research Unit*, <http://www.cru.uea.ac.uk/data>.

Note that in this figure, the y-axis represents temperature deviation from the regional average of the constituent national mean temperature deviations from 1950 levels and is measured in degrees Celsius. Each tick mark on the y-axis represents 0.5 degrees Celsius in temperature deviation, and each tick mark on the x-axis represents an elapsed period of five years. In addition to the color coding provided by the legend, each region has a region coded adjacent to the end point of the line. Many of the endpoints cluster close together, and so some of the regional codes have been shifted right while staying approximately at the same level of temperature deviation indicated on the y-axis. In 2017, the region with the lowest temperature deviation from 1950 levels was Central Africa, which had a temperature deviation of approximately 0.3 degrees Celsius. The region with the highest temperature deviation was Central Asia, which in 2017 had a temperature deviation of approximately 1.8 degrees Celsius. The difference of 1.5 degrees Celsius between these two regions is greater than the deviation of the global mean temperature from 1950 levels, though all regions experienced some increase in temperature over the course of the period studied. This means that while climate change has occurred across the globe, there is a high degree in regional difference in the effects of climate change. Additionally, this analysis demonstrates that some areas are affected more severely by climate change than others, which could lead one to believe that displacement should be higher in these areas.

Figure 4.2 illustrates the regional breakdown for displacement:

Figure 4.2:

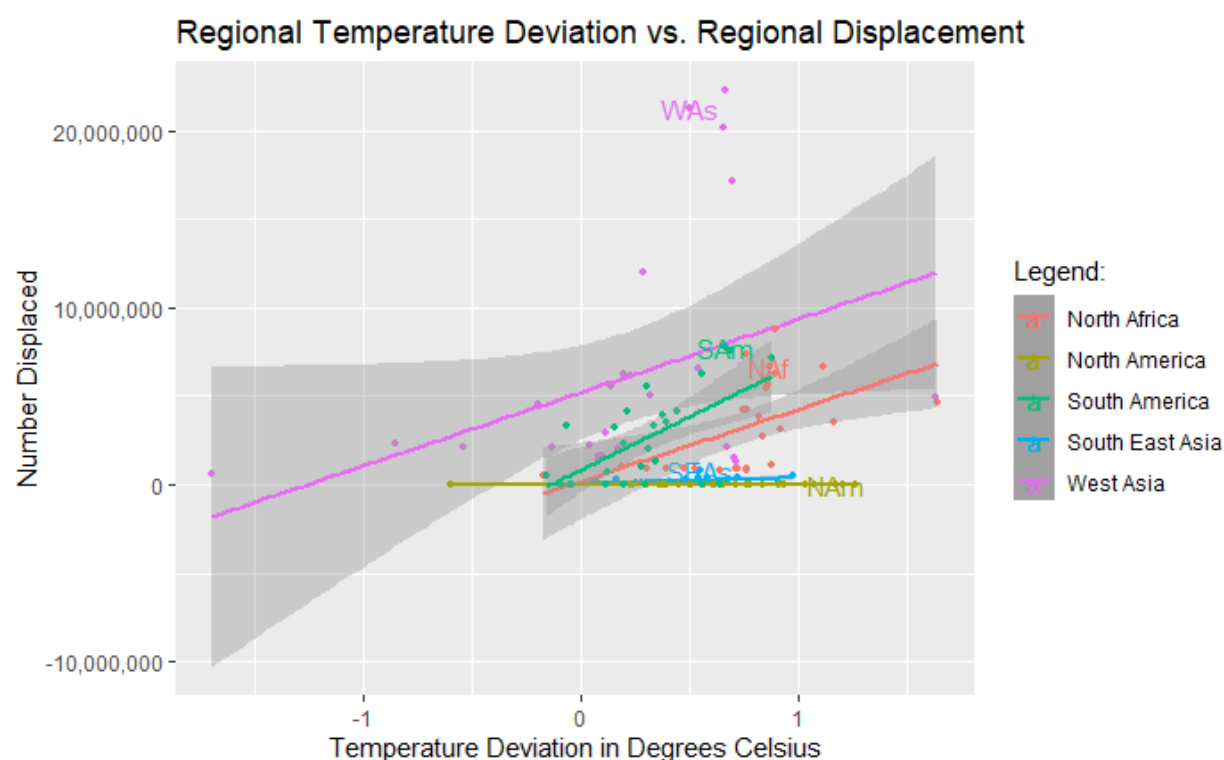
Data from UNHCR Dataset; Figure by Author¹⁵⁴

Note that for this figure, each tick mark on the y-axis represents 1.25 million displaced persons and each tick mark on the x-axis represents an elapsed period of five years. For 2017, Western Asia had the highest number of displaced persons with 8 million (largely due to the conflict in Syria), while Western Europe had the fewest displaced persons with less than a thousand total people. Interestingly, the four regions with the greatest number of displaced persons ranked at the bottom or middle of the regional temperature deviation. This is important to consider because it seems to contravene the idea one could take away from Figure 4.1, that those regions with the largest temperature deviation should see the highest number of displaced persons. Part of this is likely due to the population disparity between these regions; Central Asia has a much lower

¹⁵⁴ "UNHCR Statistics," *United Nations High Commissioner for Refugees*.

population than West Africa or South America. However, when the regional displacement and regional temperature deviation variables are juxtaposed, a possible alternative explanation emerges. Figure 4.3 illustrates this relationship below:

Figure 4.3:



Data: UNHCR Dataset, University of East Anglia Climate Research Unit; Figure by Author¹⁵⁵

Note that for this figure, the y-axis is temperature deviation in degrees Celsius, with each tick mark indicating 0.5 degrees Celsius in deviation from 1950 levels. The y-axis is the number of displaced persons. While this graph is initially difficult to interpret, there are a few useful takeaways that emerge upon closer inspection. First, consider the cluster of regions abutting the left side of the graph. Many of these regions, such as Western Europe and North East Asia have

¹⁵⁵ "UNHCR Statistics," *United Nations High Commissioner for Refugees*.

"Data," *Climate Research Unit*, <http://www.cru.uea.ac.uk/data>.

high levels of temperature deviation, as only Central Asia hits a high level of temperature deviation at any point. However, these regions barely extend over the x-axis, which means that their level of displacement does not change dramatically at any point. Even though these regions experience climate change in a dramatic way relative to the current level of global temperature increase, they do not have high populations of displaced persons.

Next, consider the regions that move furthest to the right on the x-axis. While these areas do experience noticeable climate change, most fall within the range of 0.5 to 1 degree Celsius of warming relative to 1950 levels. However, these regions also produce the highest numbers of displaced persons, with three regions exceeding the 7.5 million displaced persons at some point over the period 1992-2018. Because of this fact and the previous finding, the notion of a linear relationship between temperature increases and displacement becomes somewhat confounded. If the regions experiencing the worst effects of climate change produce the fewest refugees, and if the regions experiencing the mildest warming produce the most, then the relationship between climate change and displacement must be more complicated.

There are a number of possible explanations to this discrepancy, any one of which could explain it alone or in concert with other factors. First, the regions with the most displaced persons could experience war a higher proportion of the time or be less wealthy or developed relative to those with fewer displaced persons. This seems to be a plausible possibility at first glance, as the countries of Western Europe and North East Asia are among the wealthiest on Earth, and the majority of the states in the Organization of Economic Cooperation and Development (OECD) come from these regions. Additionally, Western Asia in particular has been a politically and militarily restive area throughout much of the period covered by this paper, and is the location of several active armed conflicts at the time of writing this. It is also possible

that climate change plays a minor or nonexistent role in displacement, though such a fact would contradict the preponderance of the scholarship being produced on climate related displacement by independent researchers and international organizations.

The other possibility is that the regions most affected by climate change have relatively low levels of displacement in spite of climate change because of their higher level of preparedness, and that countries in regions with the highest level of displacement are uniquely vulnerable to the threat posed by climate change. This notion does not conflict with the possible role of wealth, development, or the presence of armed conflict in determining the scale of displacement. Instead this notion would be in keeping with the idea of “climate injustice” or related phenomena such as “environmental racism.”¹⁵⁶ These ideas reflect the notion that poorer countries, predominantly ones with large populations of people of color and ones in the “global South” are the most vulnerable to the effects of climate change. The injustice element is derived from the idea that these countries bear the brunt of the danger of climate change despite the fact that their wealthier peers in the “global North” pollute on a far greater level per capita.¹⁵⁷ Furthermore, different forms of environmental injustice can manifest themselves within countries as well. In many instances, industries that pollute on a large scale or environmentally destructive projects have been situated within or adjacent to poor communities, communities of color, and other areas populated by marginalized groups.¹⁵⁸ It is possible that the higher level of development and greater wealth seen in areas like North America acts as a hedge against many of the causes of displacement, including conflict and climate related phenomena.

¹⁵⁶ David Ciplet, "Contesting climate injustice: Transnational advocacy network struggles for rights in UN climate politics," *Global Environmental Politics* 14, no. 4 (2014): 75-96.

¹⁵⁷ Kyle Powys Whyte, "Is it colonial déjà vu? Indigenous peoples and climate injustice," In *Humanities for the Environment*, pp. 102-119, Routledge, 2016.

¹⁵⁸ Megan Mayhew Bergman, "'They chose us because we were rural and poor': when environmental racism and climate change collide," *The Guardian*, March 8, 2019, <https://www.theguardian.com/environment/2019/mar/08/climate-changed-racism-environment-south>.

To understand how these phenomena could result in greater levels of displacement despite the relatively stronger effects of global temperature rise in areas like North America and Western Europe, it is important to assess what cases involving each have looked like historically. As a major cause of displacement, and one that has been discussed at length in this paper, armed conflict is a natural place to start. I assessed seven cases of conflict from the UNHCR and QoG data: internal conflict, absence of internal conflict, external conflict, absence of external conflict, internationalized internal conflict, absence of internationalized internal conflict, and absence of all conflict. After clustering the data around these conflict types, I fit a series of linear regressions with origin country temperature deviation from 1950 as my primary predictor and the number of displaced persons as my primary outcome. I listed the results of this analysis in the table below:

Figure 4.4: Conflict and Displacement

	External War	Internal War	Int'l Internal War	No War
(Intercept)	9.65*** (0.72)	15.12*** (0.44)	12.75*** (0.62)	14.66*** (0.14)
Temperature Deviation (Degrees Celsius)	4.14*** (1.01)	-0.53 (0.72)	1.83* (0.80)	0.75** (0.21)
R ²	0.53	0.02	0.18	0.34
Adj. R ²	0.50	-0.02	0.15	0.31
Num. obs.	17	26	26	26
RMSE	1.95	0.93	1.73	0.34

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figure by Author

In all cases except “Internal Conflict” displacement tends to be higher when climate change is more severe. Additionally, though external war seems to produce the highest amount of displacement as climate change increases, it should be noted that there are relatively few external

wars compared to either internal wars or internationalized internal wars, which could skew the data if those external wars it accounts for are particularly devastating.

It is also useful to think about the degree to which the onset of war is influenced by climate change. Considering the fact that current scholarship has discussed the role of climate change in conflicts like the Syrian Civil War, it is possible that there is a relationship between climate change and the number of conflicts visible in the data. I created a dummy variable to unpack the relationship between climate change and the onset of conflict based on the cases listed in the data. The results are summarized in the table below:

Figure 4.5: Climate Change and the Onset of War

	War
(Intercept)	0.02 (0.01)
Temperature Deviation (Degrees Celsius)	0.08*** (0.00)
R ²	0.20
Adj. R ²	0.20
Num. obs.	108858
RMSE	0.27

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figure by Author

Based on the observed cases of war from the QoG dataset, this model indicates that there is a positive relationship between increases in temperature deviation and the onset of war. Based on these cases, for every degree Celsius in temperature deviation above the mean temperature level in 1950, the chance of war occurring increases by 8%. This is of course an oversimplified narrative of how wars begin. The causes of war are typically numerous and the exact relationship between the severity of climate change the onset of war can vary considerably. However, I return to a discussion of war and climate change in Chapter V for my case study on the Second Persian Gulf War in Iraq and the ongoing Syrian Civil War.

Next, I looked at the role of demographic pressure, which as a variable includes many threats to human security that may or may not involve climate change as well as the government's capacity to respond to these crises. The variable I used for this table comes from QoG and is set on a numerical scale from 0 to 10. For this analysis, I clustered my data regionally before fitting my linear models in order to better understand the more local effects of demographic pressure on displacement. I also included a global model so as to retain an understanding of the net effect of this pressure. The results are listed in the table below:

Figure 4.61-4.64: Demographic Pressure and Displacement

	Global	West Asia	North East Asia	South East Asia	South Asia
(Intercept)	32.52*** (4.51)	24.24*** (5.16)	12.94*** (0.31)	18.85** (4.94)	31.48*** (5.34)
Demographic Pressure	-2.10** (0.61)	-1.25 (0.77)	-0.16** (0.04)	-1.01 (0.72)	-2.12** (0.66)
R ²	0.51	0.19	0.55	0.15	0.48
Adj. R ²	0.47	0.12	0.51	0.07	0.44
Num. obs.	13	13	13	13	13
RMSE	0.33	0.65	0.10	0.53	0.64

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	Central Asia	Central Africa	South Africa	North Africa	West Africa
(Intercept)	17.51*** (2.44)	8.52 (6.00)	13.14** (3.59)	23.24*** (1.20)	0.96 (7.22)
Demographic Pressure	-0.36 (0.32)	0.15 (0.73)	-0.23 (0.41)	-1.03*** (0.16)	1.48 (0.90)
R ²	0.10	0.00	0.03	0.79	0.20
Adj. R ²	0.02	-0.09	-0.06	0.78	0.12
Num. obs.	13	13	13	13	13
RMSE	0.35	0.73	0.37	0.14	1.26

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	East Africa	South America	Central America	North America
(Intercept)	0.34 (5.88)	23.54** (5.60)	25.22*** (2.98)	5.26*** (0.95)
Demographic Pressure	1.65* (0.66)	-1.41 (0.96)	-2.11*** (0.43)	0.72** (0.18)
R ²	0.36	0.16	0.69	0.60
Adj. R ²	0.30	0.09	0.66	0.56
Num. obs.	13	13	13	13
RMSE	0.31	0.37	0.65	0.30

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	Western Europe	Eastern Europe	Oceania
(Intercept)	5.05*** (0.73)	17.29*** (1.84)	6.73*** (0.37)
Demographic Pressure	0.62* (0.25)	-1.08* (0.39)	0.03 (0.09)
R ²	0.36	0.41	0.01
Adj. R ²	0.30	0.36	-0.08
Num. obs.	13	13	13
RMSE	0.35	1.12	0.24

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ *Figures by Author*

These results seemed to run contrary my underlying assumption about the relationship between this variable and displacement. I initially hypothesized that as demographic pressure increased, incidence of displacement would also increase. However, in most regions this turns out not to be the case. With the exception of North Africa and East Africa, displacement seems negatively correlated with demographic pressure. Counterintuitive as this may be, there are two possible explanations for this phenomenon, both of which are in keeping with the evidence for the role of climate injustice. First, places with lower demographic pressure may be under less strain because people already fled or are in the process of fleeing these territories, which would create the negative relationship between these two variables seen in many regions. Second, it could be the case that the lower incidence of displacement in areas with high demographic pressure is due to the material inability of the inhabitants of those regions to flee. In such a case, those who would flee if they could be constrained financially or logistically from escaping disasters or inhospitable conditions because of poverty. This too would point to possible climate injustice and would complicate the notion of privilege in regard to displacement. Among members of disadvantaged or at-risk groups, those who do flee may be relatively better off than those who do not because they have the resources that allow them to evacuate, whereas the critically impoverished may be unable to do so. This likely would not hold in all cases, but it is a possible explanatory mechanism that confounds the traditional, oversimplified notion of displaced persons as belonging to a monolithic class defined by their mobility and victimization.

Next, I utilized the Freedom House ranking system to determine what role political freedom and human rights play in displacement (some of the shortcomings associated with this variable have been discussed in Chapter III). Since the legal definition of refugee is designed in part to cover instances of political persecution or repression, it is important to understand the role

that individual liberty has played in influencing displacement in recent history. Once again, I clustered my data regionally and fit a linear model for each region as well as the global populations. The results are listed in the figure below:

Figure 4.71-4.74: Freedom House Ranking and Displacement

	Global	West Asia	North East Asia	South East Asia	South Asia
(Intercept)	24.15*** (1.44)	18.40*** (0.81)	10.36*** (0.37)	14.06*** (0.99)	11.35*** (0.63)
Freedom House Score	-10.00*** (2.05)	-4.86** (1.54)	2.14** (0.55)	-2.37 (1.10)	3.25*** (0.67)
R ²	0.68	0.48	0.58	0.30	0.68
Adj. R ²	0.65	0.43	0.55	0.24	0.66
Num. obs.	13	13	13	13	13
RMSE	0.27	0.52	0.09	0.48	0.50

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	Central Asia	Central Africa	South Africa	North Africa	West Africa
(Intercept)	14.92*** (0.08)	9.67*** (0.30)	11.79*** (0.41)	14.20*** (0.24)	0.10 (4.54)
Freedom House Score	-1.59** (0.40)	0.29 (0.91)	-1.37 (0.84)	3.90*** (0.76)	13.16* (4.70)
R ²	0.59	0.01	0.19	0.70	0.42
Adj. R ²	0.55	-0.08	0.12	0.68	0.36
Num. obs.	13	13	13	13	13
RMSE	0.24	0.73	0.34	0.17	1.07

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	East Africa	South America	Central America	North America
(Intercept)	15.31*** (0.22)	-8.66 (3.97)	3.02* (1.34)	8.35*** (0.61)
Freedom House Score	-0.85 (0.50)	15.21*** (2.52)	9.03*** (1.57)	0.45 (0.38)
R ²	0.21	0.77	0.75	0.12
Adj. R ²	0.14	0.75	0.73	0.03
Num. obs.	13	13	13	13
RMSE	0.35	0.19	0.58	0.45

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	Western Europe	Eastern Europe	Oceania
(Intercept)	-29.30 (120.57)	24.18*** (2.94)	4.77*** (0.69)
Freedom House Score	18.07 (60.30)	-8.02** (1.97)	1.28* (0.42)
R ²	0.01	0.60	0.46
Adj. R ²	-0.08	0.56	0.41
Num. obs.	13	13	13
RMSE	0.44	0.92	0.18

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figures by Author

These results are perhaps the most difficult to interpret, because many regions returned extremely large coefficients that contradict those in other regions. While there is a small global trend that points to a decrease in displacement as the level of political freedom increases, this trend seems to emerge because many regions have coefficients with conflicting signs. Further study with an expanded dataset better tailored to the study individual liberties at a national and regional could potentially unpack this trend, but the UNHCR and QoG datasets do not appear to have the requisite variables to analyze these trends at this time. Furthermore, because of the subjective nature of freedom indices, they are not necessarily the most useful tools for this type of quantitative analysis. Additionally, since regional outliers in terms of degree of political freedom could throw off the relationship between political freedom and displacement, which may help to explain the large coefficients in certain regions.

Economic decline can also lead to displacement, as a weak economy can become incapable of supporting employment for a significant portion of the population. In certain cases, this type of decline can be related to climate change as well. When drought persists for a long enough time, it can eradicate the agricultural capacity of a particular area; additionally, when the ocean acidifies, fish stocks can collapse and render aquaculture impossible to maintain. Even outside the context of climate change, economic decline can lead to displacement. For this analysis, I clustered my data regionally and fit a series of linear regressions to determine the extent to which economic decline can influence displacement. The results are listed in the table below:

Figure 4.81-4.84: Economic Decline and Displacement

	Global	West Asia	North East Asia	South East Asia	South Asia
(Intercept)	10.60 (7.68)	-4.92 (7.77)	11.89*** (0.61)	15.20*** (1.43)	15.71* (5.36)
Economic Decline	0.98 (1.16)	3.31* (1.24)	-0.02 (0.14)	-0.62* (0.27)	-0.20 (0.79)
R ²	0.06	0.39	0.00	0.32	0.01
Adj. R ²	-0.02	0.34	-0.09	0.26	-0.08
Num. obs.	13	13	13	13	13
RMSE	0.46	0.56	0.14	0.47	0.89

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	Central Asia	Central Africa	South Africa	North Africa	West Africa
(Intercept)	24.16*** (3.35)	7.73* (2.83)	14.16*** (2.51)	11.31*** (0.87)	2.58 (11.37)
Economic Decline	-1.28* (0.46)	0.28 (0.40)	-0.42 (0.35)	0.58*** (0.12)	1.39 (1.55)
R ²	0.42	0.04	0.12	0.67	0.07
Adj. R ²	0.36	-0.04	0.04	0.64	-0.02
Num. obs.	13	13	13	13	13
RMSE	0.28	0.71	0.35	0.18	1.35

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	East Africa	South America	Central America	North America
(Intercept)	18.55*** (2.95)	17.02*** (1.72)	24.89*** (1.97)	6.49*** (0.53)
Economic Decline	-0.46 (0.38)	-0.37 (0.38)	-2.19*** (0.30)	0.60*** (0.12)
R ²	0.12	0.08	0.83	0.69
Adj. R ²	0.04	-0.00	0.81	0.66
Num. obs.	13	13	13	13
RMSE	0.37	0.38	0.48	0.27

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	West Europe	East Europe	Oceania
(Intercept)	8.93*** (0.73)	-3.64 (8.71)	6.17*** (0.27)
Economic Decline	-0.62* (0.21)	2.94 (1.61)	0.15* (0.06)
R ²	0.43	0.23	0.37
Adj. R ²	0.38	0.16	0.32
Num. obs.	13	13	13
RMSE	0.33	1.28	0.19

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ *Figures by Author*

Much like the case with the demographic pressure variable, the seemingly counterintuitive results here could be attributed to fundamental equalities across regions. Economic decline is negatively correlated with displacement in regions like Western Asia and South America which have high levels of displacement overall and positively correlated with displacement in areas like North America and to an even greater extent Eastern Europe despite the fact that displacement in these regions is relatively low. This could be attributed to the fact that economic decline does not account for the overall economic wellbeing or development level of a state or region, since a decline in an impoverished area could leave someone materially incapable of leaving in one area while necessitating it in a middle or high income region. Additionally, since this variable accounts for economic decline generally rather than the severity of a decline, it could be possible that there is some context the data overlooks that would otherwise account for the differences between regions.

Uneven economic development helps to unpack the internal dynamics of national and regional economies in the area of wealth and development distribution. Inequality in these areas can lead to conditions of relative or absolute deprivation that are masked by high incomes and development elsewhere in an economy, and this deprivation can lead to displacement on its own or through mediating factors such as greater vulnerability to the effects of climate change. For this analysis, I clustered my data regionally and fit a series of linear regressions to determine the extent to which uneven economic development can influence displacement. The results are listed in the table below:

Figure 4.91-4.94: Uneven Economic Development

	Global	West Asia	North East Asia	South East Asia	South Asia
(Intercept)	25.47*** (0.98)	24.06*** (1.04)	13.19*** (0.35)	15.93*** (1.18)	19.40*** (1.96)
Uneven Development	-1.15*** (0.13)	-1.16*** (0.15)	-0.19** (0.05)	-0.61** (0.18)	-0.63* (0.24)
R ²	0.87	0.85	0.59	0.51	0.38
Adj. R ²	0.86	0.84	0.55	0.47	0.32
Num. obs.	13	13	13	13	13
RMSE	0.17	0.28	0.09	0.40	0.70

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	Central Asia	Central Africa	South Africa	North Africa	West Africa
(Intercept)	17.70*** (0.96)	14.93 (11.83)	18.10* (6.10)	19.46*** (0.68)	24.49 (17.42)
Uneven Development	-0.41* (0.13)	-0.65 (1.48)	-0.80 (0.70)	-0.55*** (0.09)	-1.48 (2.20)
R ²	0.46	0.02	0.11	0.77	0.04
Adj. R ²	0.41	-0.07	0.02	0.75	-0.05
Num. obs.	13	13	13	13	13
RMSE	0.27	0.72	0.36	0.15	1.37

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	East Africa	South America	Central America	North America
(Intercept)	5.09 (13.09)	22.92*** (1.63)	29.91*** (5.38)	7.10*** (0.64)
Uneven Development	1.28 (1.69)	-1.06*** (0.23)	-2.62** (0.73)	0.32* (0.10)
R ²	0.05	0.66	0.54	0.46
Adj. R ²	-0.04	0.63	0.50	0.41
Num. obs.	13	13	13	13
RMSE	0.38	0.23	0.78	0.35

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	West Europe	East Europe	Oceania
(Intercept)	5.51*** (0.65)	18.40*** (1.60)	7.31*** (0.47)
Uneven Development	0.38 (0.19)	-1.20** (0.31)	-0.09 (0.09)
R ²	0.28	0.58	0.08
Adj. R ²	0.21	0.54	-0.00
Num. obs.	13	13	13
RMSE	0.37	0.95	0.23

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ *Figures by Author*

There are a number of similarities between the results for this variable and variables like demographic pressure. This is likely due to the fact that the adverse effects of demographic pressure and wealth inequality are felt by the worst off in society to a higher degree than wealthier individuals within a society. Additionally, the negative relationship with displacement seen in certain regions could speak to a higher magnitude of intrasocietal inequality or an lower mean level of development generally, both of which would position the lower bound of the socioeconomic spectrum at a level that could be sufficiently low to render movement impossible. A common thread throughout the economic control variables has been a lack of uniformity that may nonetheless contribute evidence to the notion that climate injustice or environmental racism plays an outsized role in impacting the degree to which climate change causes displacement. This would help to explain why regions like North America see such a low level of displacement despite its above average exposure to the effects of climate change.

The Fragile State Index combines most of the variables previously discussed along with others mentioned in Chapter III to form a composite score of 0 to 120. A score of 0 indicates perfect governance, whereas a score of 120 indicates the least stable possible governance. Because this index combines a number of different variables, it is not as useful for determining the role of particular forces within a country or region. However, it is a very effective catch-all for economic and governance related factors that can contribute to displacement. For this analysis, I clustered my data regionally and fit a series of linear regressions to determine the extent to which the factors included in the index can influence displacement. The results are listed in the table below:

Figure 4.101-4.104: Fragile State Index and Displacement

	Global	West Asia	North East Asia	South East Asia	South Asia
(Intercept)	-12.52 (10.47)	-14.32** (3.75)	13.83*** (0.74)	22.09** (6.63)	17.48 (16.26)
Fragile State Index	0.35* (0.12)	0.34*** (0.04)	-0.03* (0.01)	-0.13 (0.09)	-0.03 (0.18)
R ²	0.42	0.85	0.40	0.18	0.00
Adj. R ²	0.37	0.84	0.35	0.10	-0.09
Num. obs.	13	13	13	13	13
RMSE	0.36	0.27	0.11	0.52	0.89

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	Central Asia	Central Africa	South Africa	North Africa	West Africa
(Intercept)	25.60*** (4.16)	7.46 (5.30)	9.46 (10.06)	2.35 (3.91)	-16.19 (15.98)
Fragile State Index	-0.12* (0.05)	0.03 (0.06)	0.02 (0.11)	0.14** (0.04)	0.32 (0.18)
R ²	0.38	0.02	0.00	0.50	0.23
Adj. R ²	0.32	-0.07	-0.09	0.46	0.16
Num. obs.	13	13	13	13	13
RMSE	0.29	0.72	0.38	0.22	1.23

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	East Africa	South America	Central America	North America
(Intercept)	-2.32 (4.81)	28.43*** (1.61)	37.30*** (5.20)	4.19** (1.21)
Fragile State Index	0.18** (0.05)	-0.19*** (0.02)	-0.34*** (0.07)	0.08** (0.02)
R ²	0.54	0.86	0.71	0.60
Adj. R ²	0.50	0.85	0.68	0.56
Num. obs.	13	13	13	13
RMSE	0.26	0.15	0.62	0.30

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

	West Europe	East Europe	Oceania
(Intercept)	12.55** (3.95)	5.92 (17.36)	6.21*** (0.34)
Fragile State Index	-0.18 (0.13)	0.11 (0.29)	0.01 (0.01)
R ²	0.16	0.01	0.25
Adj. R ²	0.08	-0.08	0.18
Num. obs.	13	13	13
RMSE	0.40	1.45	0.21

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figures by Author

The important takeaway here is that some regions are significantly more susceptible to the effects of poor governance and economic performance than others. While some regions see strong negative correlations between state fragility and displacement (which contribute to a rather unremarkable global trend), for many regions a decrease in state stability correlates to an increase in displacement on the order of anywhere from 124 to over 740,000 displaced persons. Many of the regions most severely affected by this trend are also those least affected by climate change, which further compounds the notion that climate injustice disproportionately affects regions beyond what is traditionally thought of as the industrialized world (North America, West Europe, North East Asia, and Oceania for the purposes of this project).

Finally, in the concluding models for the Large-N Data section of this project, I fit two models that correspond to a best- and worst-case scenario for climate displacement based on historical data. Since many of the variables discussed above are contained within the Fragile State Index variable, I opted to use the index and supplemented it with the economic decline variable when fitting the second model. Additionally, since internationalized internal conflict is the most common type of armed conflict over the period studied, I used this variable as a catch all for war for the purposes of the second model. The results for the two models are listed below:

Figure 4.11: “Worst-Case and Best-Case Scenario” Models

	Worst Case Scenario	Best Case Scenario
(Intercept)	15.35*** (0.46)	11.90 (6.60)
MeanTemperature Deviation	2.53** (0.65)	1.51* (0.49)
War		0.33* (0.14)
Freedom House Score		−4.10* (1.40)
Fragile State Index		−0.02 (0.14)
Economic Decline		1.31 (1.03)
R ²	0.58	0.95
Adj. R ²	0.54	0.92
Num. obs.	13	13
RMSE	0.31	0.13

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figure by Author

Model 1 represents what I term the “Worst Case Scenario,” which represents the total effects of climate change on displacement. Model 2 represents the “Best Case Scenario” in that it controls for these same variables so as to present the mediated effects of climate change. In fitting these models, I attempted to create a range of possible values for the relationship between climate change and displacement. Since it is functionally impossible to know the exact causal relationship between climate change and displacement due to the fact that we can only observe the historical data rather than what would have happened under different circumstances, my intention is instead to demonstrate a range of plausible coefficients for this relationship. The coefficient for Model 1 has a much higher degree of statistical significance than Model 2, though the coefficients are not as different from one another as I expected (an approximately 253% increase in the number of displaced persons per degree Celsius in warming vs 151%).

However, in all likelihood, both of these figures lean to the conservative side. The data collected by UNHCR documents people under the stewardship of the organization; many more

displaced persons are never accounted for either due to the temporary nature of their displacement or because they do not meet the UNHCR's criteria. This is an important consideration to keep in mind when assessing the validity of these coefficients. Nonetheless, because they are likely to be too conservative if anything, the coefficients remain useful for assessing the displacement regime's capabilities when that issue is discussed in Chapter VI.

Chapter V: Iraq and Syria Case Study

The irony is that, having fought for survival for so long, many of us now only desire death. I hasten to kill my days by sleeping, although I know these are supposed to be the most beautiful days of my life, when I should rise high, make something of myself. Perhaps sleep is like death. In both cases we become nothing. I sleep to become nothing. I spend all my days in this bed in a refugee camp in Samos, Greece, thinking about how the journey that brought me to this place began.¹⁵⁹

Eyad Awwadawnan
Refugee from Syria

In this chapter, I explore some of the relationships between climate change and displacement examined in Chapter III and IV in the context of two similar cases: Iraq during the Second Iraq War (2003-2011) and Syria during the Syrian Civil War (2011-present). These conflicts are similar to each other in that both are largely civil conflicts with large international presence, and the countries are geographically similar in that they border each other. While there are differences between the two conflicts (Iraq starting with an unsanctioned U.S. led invasion to topple the regime of Saddam Hussein and Syria beginning with protests against the authoritarian rule of Bashar al-Assad), they are similar enough geographically, demographically, and militarily for meaningful comparison. Therefore, they represent a useful case for closer examination of what climate change's impact has been historically and how it has changed in similar cases over time.

¹⁵⁹ Eyad Awwadawnan, "I Have Become Lost Like My Homeland," *Slate*, August 2, 2018, <https://slate.com/news-and-politics/2018/08/one-refugees-firsthand-account-of-his-harrowing-journey-from-syria-to-greece.html>.

The Second Iraq War

Following the end of the First Iraq War (also known as the Persian Gulf War or Operation Desert Storm), the U.S. military continued to maintain a military presence in the region. This included maintaining a “no-fly zone” over southern and northern Iraq intended to prevent the Iraqi Air Force from bombing the Arab Shia majority in the South or the Sunni Kurdish minority in the North.¹⁶⁰ During the Clinton administration, sanctions and the air campaign continued, which maintained a shaky diplomatic and humanitarian situation that had emerged during after the end of the First Iraq War in 1991. However, while the President Clinton signed the Iraq Liberation Act into law in 1998, which enshrined regime change as the official U.S. policy regarding Iraq, he did not actively pursue regime change by military means.¹⁶¹

However, this changed in the aftermath of the September 11th terror attacks. The idea of regime change had first been popularized by neoconservative politicians like Robert Kagan, Bill Kristol, and their fellows at the Project for a New American Century.¹⁶² Many members of this organization, including Paul Wolfowitz, later joined the Second Bush administration, where they continued to advocate for regime change. September 11th prompted many Iraq hawks to resume calls for regime change despite the lack of firm relationship between the Iraqi government and the Al Qaeda hijackers. Nonetheless, the administration pursued armed intervention on these grounds as well as by claiming that Saddam Hussein’s government was maintaining a stockpile

¹⁶⁰ The Iraqi government under Saddam Hussein was notionally secular, but was primarily responsive to the Arab Sunni population, which Saddam Hussein belonged to.

“Containment: The Iraqi no-fly zones,” *BBC*, December 29, 1998, http://news.bbc.co.uk/2/hi/events/crisis_in_the_gulf/forces_and_firepower/244364.stm.

¹⁶¹ “H.R.4655 - Iraq Liberation Act of 1998,” *Congress.gov*, <https://www.congress.gov/bill/105th-congress/house-bill/4655>.

¹⁶² “Project for a New American Century, Open Letter to President Clinton, 1998,” *PNAC*, 1998, <http://www.robmacdougall.org/4301/4301.25.USsince2001.pdf>.

of weapons of mass destruction (WMDs).¹⁶³ Though neither of these claims were found to be true, the invasion continued, and on March 20, 2003, the United States invaded Iraq.

While the initial campaign against the Iraqi government only lasted until April 30, 2003, the war dragged for nearly a decade. Domestic opposition to U.S. forces, opposition to the U.S. backed government under Nouri al-Maliki, and foreign aid from Syria, Iran and elsewhere to insurgent groups led to widespread violence that killed and displaced hundreds of thousands of Iraqis. Furthermore, though the U.S. officially ended combat operations in Iraq in 2011, the Obama administration later used the 2002 Authorization for the Use of Military Force to combat Daesh (otherwise known as Islamic State), after which U.S. forces reestablished a major presence in the country. The third phase of the conflict and its aftermath continues to involve U.S. forces, with American servicemembers engaged in combat operations as of 2020.

The Syrian Civil War

Unlike Iraq, the war in Syria was not caused by foreign intervention (though it would later play a major role). Broadly speaking, the conflict began when Syrian citizens began protesting the rule of President Bashar al-Assad in January 2011, the Syrian offshoot of what came to be known as the Arab Spring.¹⁶⁴ The Syrian government is effectively a hereditary presidency and is run in an authoritarian manner. Discontent with authoritarianism, economic malaise, and rapid urbanization resulting from a drought led to protests in the winter and spring of 2011. After months of anti-government protests and violent responses by the state's security

¹⁶³ Sam Tannenhaus, "Deputy Secretary Wolfowitz Interview with Sam Tannenhaus, Vanity Fair," May 9, 2003, <https://web.archive.org/web/20060427065632/http://www.defenselink.mil/transcripts/2003/tr20030509-depsecdef0223.html>.

¹⁶⁴ Linda Khatib and Ellen Lust, *Taking to the Streets: The Transformation of Arab Activism*, Baltimore: Johns Hopkins University Press, 2014, 161.

apparatus, a group of Army officers defected and formed the Free Syrian Army (FSA) on July 29, 2011.¹⁶⁵ This organization formed the initial armed rebel force combating the Assad regime.

As the war progressed, the rebellion began to fragment and falter, as the power vacuum was filled by various Sunni Islamist groups, including Daesh, which seized over half the country at one point in the war and engaged in genocidal violence against ethnic and religious minorities in the country.¹⁶⁶ The United States intervened against Daesh, working with Syrian Kurds and other groups to fight Daesh.¹⁶⁷ Additionally, the U.S. armed various anti-Assad groups, including the FSA, though many of the weapons ended up in the hands of Daesh and its allies.¹⁶⁸ American forces have also attacked Syrian installations at various point in response to the Syrian government's use of chemical weapons against civilians.¹⁶⁹ Iran and Russia have both intervened on behalf of the Syrian government, which has allowed Assad's forces to contain the rebels (now backed by Turkey) to a small corner of northwest Syria around Idlib.¹⁷⁰

The war has been marked by widespread human rights abuses and fomented one of the most severe refugee crises in modern history. Millions of Syrians have left the country for Turkey and countries in the European Union. Many more remain internally displaced. The ongoing crisis around Idlib (which is not reflected in current data) would likely increase the

¹⁶⁵ Joshua Landis, "Free Syrian Army Founded by Seven Officers to Fight the Syrian Army," *Syria Comment*, July 29, 2011, <https://www.joshualandis.com/blog/free-syrian-army-established-to-fight-the-syrian-army/>.

¹⁶⁶ Kareem Shaheen, "Isis 'controls 50% of Syria' after seizing historic city of Palmyra," *The Guardian*, May 21, 2015, <https://www.theguardian.com/world/2015/may/21/isis-palmyra-syria-islamic-state>.

¹⁶⁷ "US to arm Kurdish fighters against Isis in Raqqa, despite Turkish opposition," *The Guardian*, May 9, 2017, <https://www.theguardian.com/world/2017/may/09/us-arm-kurdish-fighters-syria-isis-raqqa-trump>.

¹⁶⁸ Dan Lamothe, "U.S. Accidentally Delivered Weapons to the Islamic States by Airdrop, militants say," *The Washington Post*, October 24, 2014, <https://www.washingtonpost.com/news/checkpoint/wp/2014/10/21/u-s-accidentally-delivered-weapons-to-the-islamic-state-by-airdrop-militants-allege/>.

¹⁶⁹ Barbara Starr and Jeremy Diamond, "Trump launches military strike against Syria," *CNN*, April 7, 2017, <https://web.archive.org/web/20170407021906/http://edition.cnn.com/2017/04/06/politics/donald-trump-syria-military/index.html>.

¹⁷⁰ Martin Chulov, "Hounded by war, can Idlib's desperate civilians outrun final assault?" *The Guardian*, March 13, 2020, <https://www.theguardian.com/world/2020/mar/13/war-idlib-civilians-syria-assad>.

number of displaced persons significantly in any analysis.¹⁷¹ Regardless, the refugee crisis, compounded by movement from North Africa, Afghanistan, Iraq, and elsewhere across the Mediterranean remains one of the largest in history.¹⁷² The international community and organizations like the UN were poorly equipped for the task at hand, leading to domestic political unrest in Europe and the under provision of goods and services to migrating populations.

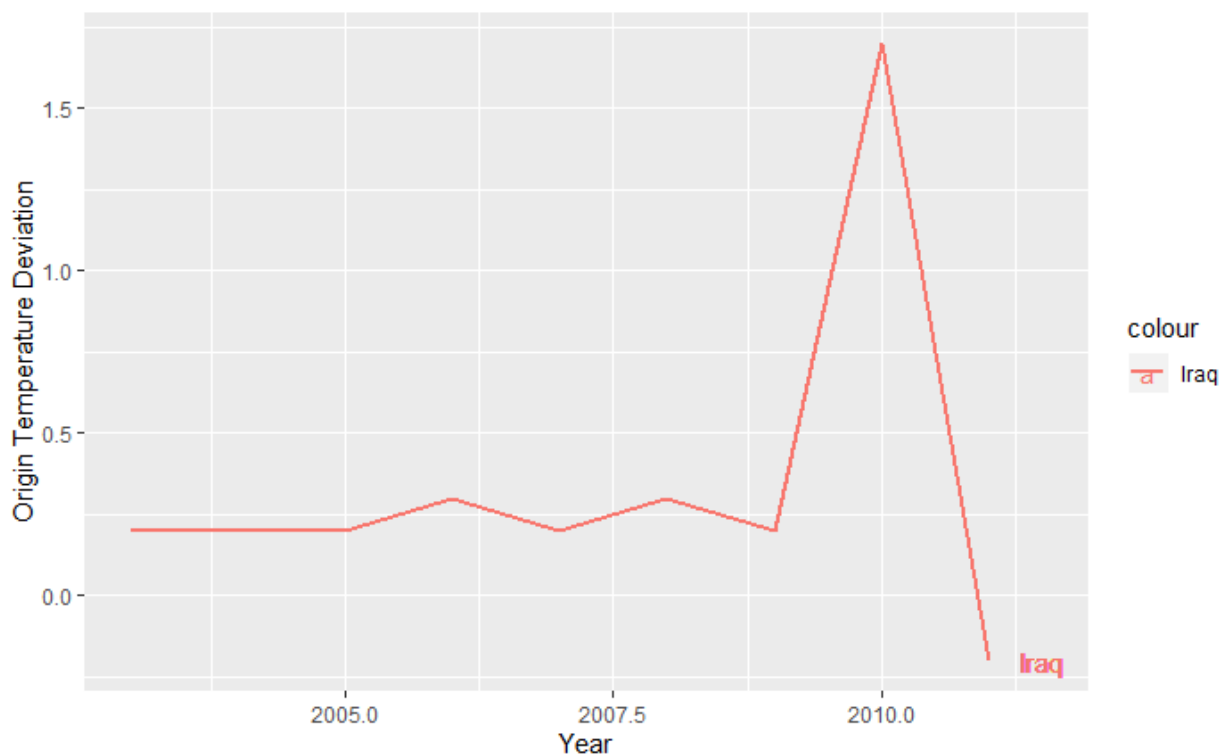
Iraq

Starting with the Second Iraq War, country specific temperature deviation is the most important local climate indicator to consider. Using country temperature data from the University of East Anglia's Climate Research Unit, I constructed a country level temperature deviation variable, which indicates the difference in degrees Celsius between the average temperature in a given year and the average temperature in 1950. These data are plotted in Figure 5.1 below:

¹⁷¹ Ibid.

¹⁷² "75 years of major refugee crises around the world," *The Washington Post*, <https://www.washingtonpost.com/graphics/world/historical-migrant-crisis/>.

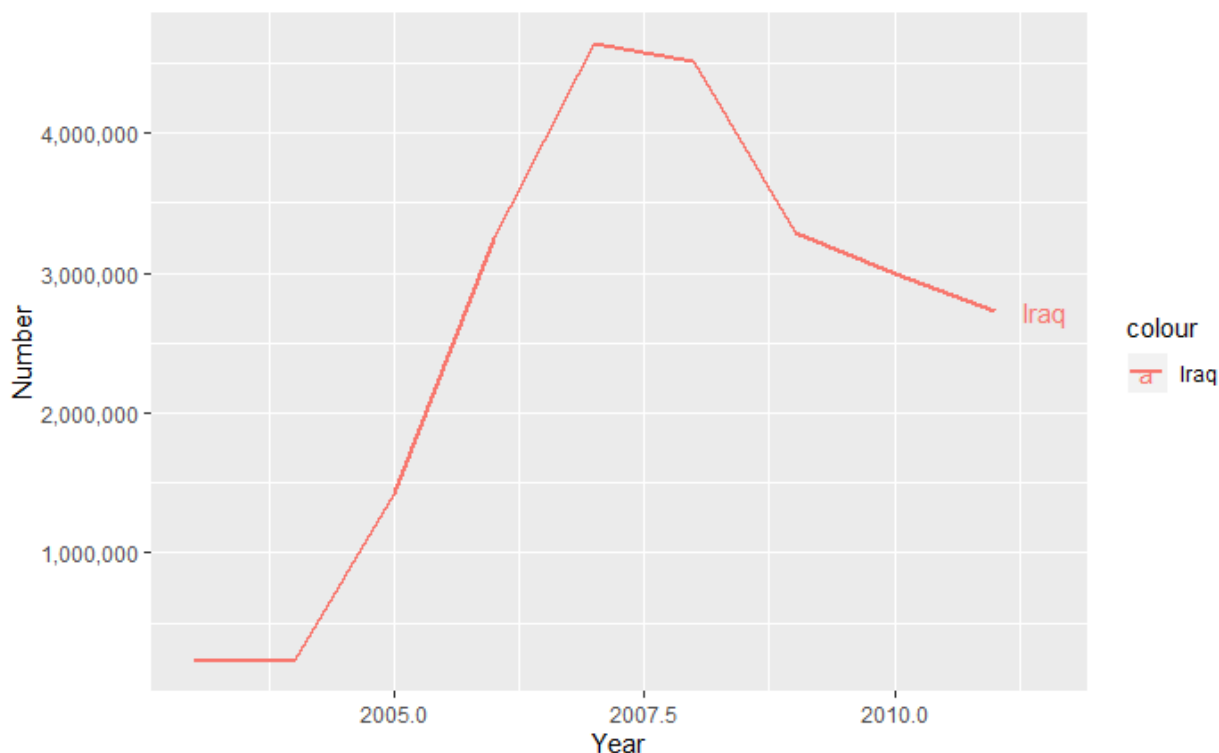
Figure 5.1: Temperature Deviation in Iraq (Degrees Celsius) 2003-2011



Data From UEA CRU; Figure by Author

The Second Iraq War coincided with generally stable temperature deviation during the first six years of the conflict (2003-2009). During this time, Iraq's mean temperature deviation generally fell between 0.2 and 0.3 degrees Celsius. However, 2010 was an unusually warm year, reaching a mean temperature deviation of 1.7 degrees Celsius. While temperatures returned closer to the normal range of previous years (dropping below the 1950 mean in 2011), the 2010 temperature spike is important, and feature more prominently in the analysis when I discuss the war in Syria.

However, before turning to Syria, it is important to consider Iraq's displacement figures over the course of the war. These displacement data are listed below in Figure 5.2:

Figure 5.2 Displacement in Iraq 2003-2011

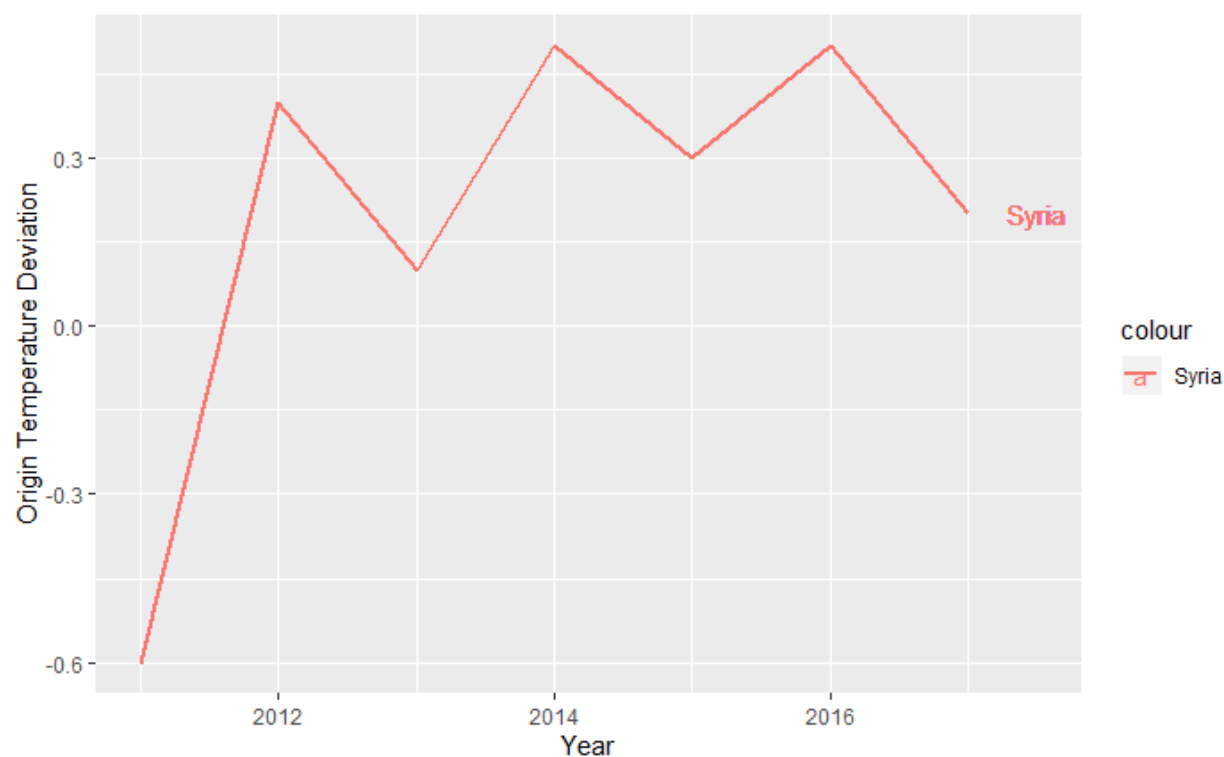
Data From UNHCR; Figure by Author

While several hundred thousand people had been displaced from Iraq prior to the U.S. led invasion in 2003, the number of displaced persons did not begin in earnest until after the invasion. The number of displaced persons peaked just prior to the 2007 troop surge by the Bush Administration, but even after the official cessation of U.S. combat operations in 2011 more than 2.5 million Iraqis remained displaced in some form.

Syria

I utilized the same data from the University of East Anglia's Climate Research Unit when addressing the case of the Syrian Civil War as well. While the war is ongoing when I write this (March 2020), the the temperature deviation data for the war from 2011-2018 is depicted in Figure 5.3 below:

Figure 5.3: Temperature Deviation in Syria (Degrees Celsius) 2011-2018

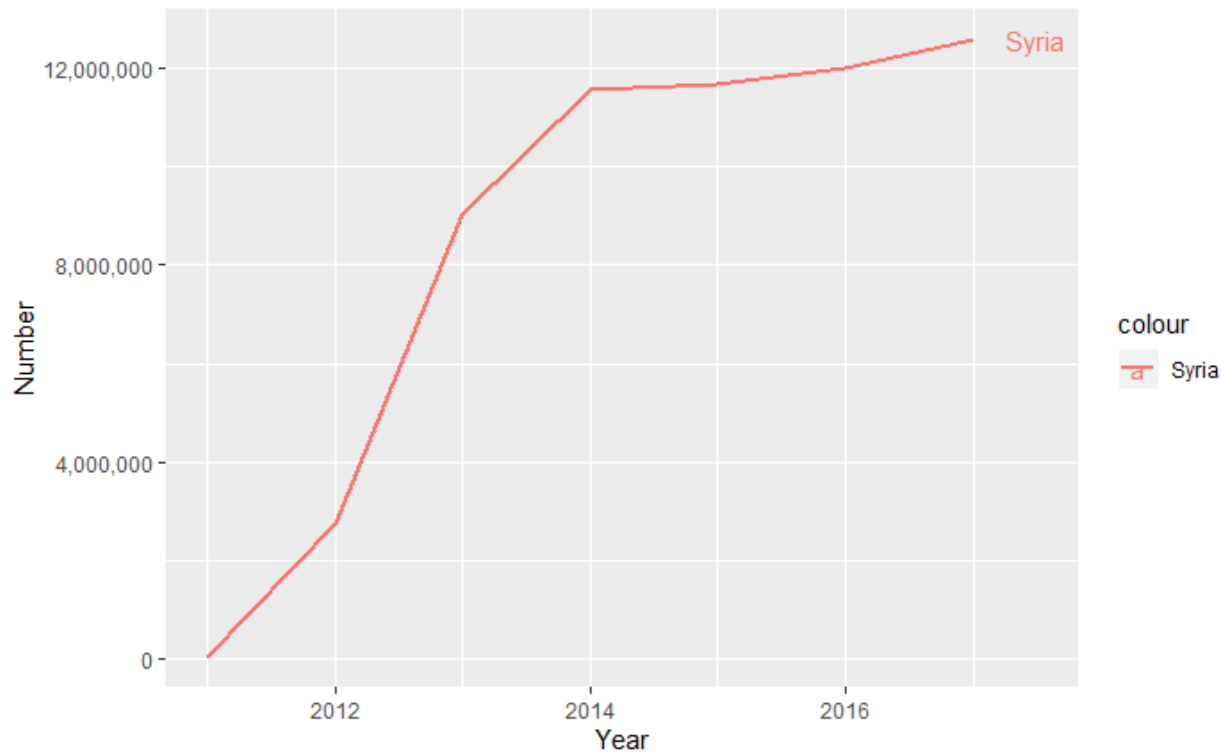


Data From UEA CRU; Figure by Author

As in the case of Iraq, 2011 was an exceptionally cold year in Syria. However, the temperature deviation quickly shot up after this cold spell, climbing to around 0.4 degrees Celsius of temperature deviation in 2012. From this point on, the temperature oscillated between 0.1 and 0.45 degrees of temperature deviation for the rest of the war.

Next, consider the number of displaced persons in Syria over the course of the conflict.

Figure 5.4 illustrates the changes in this population over time below:

Figure 5.4 Displacement in Syria 2011-2018

Data From UNHCR; Figure by Author

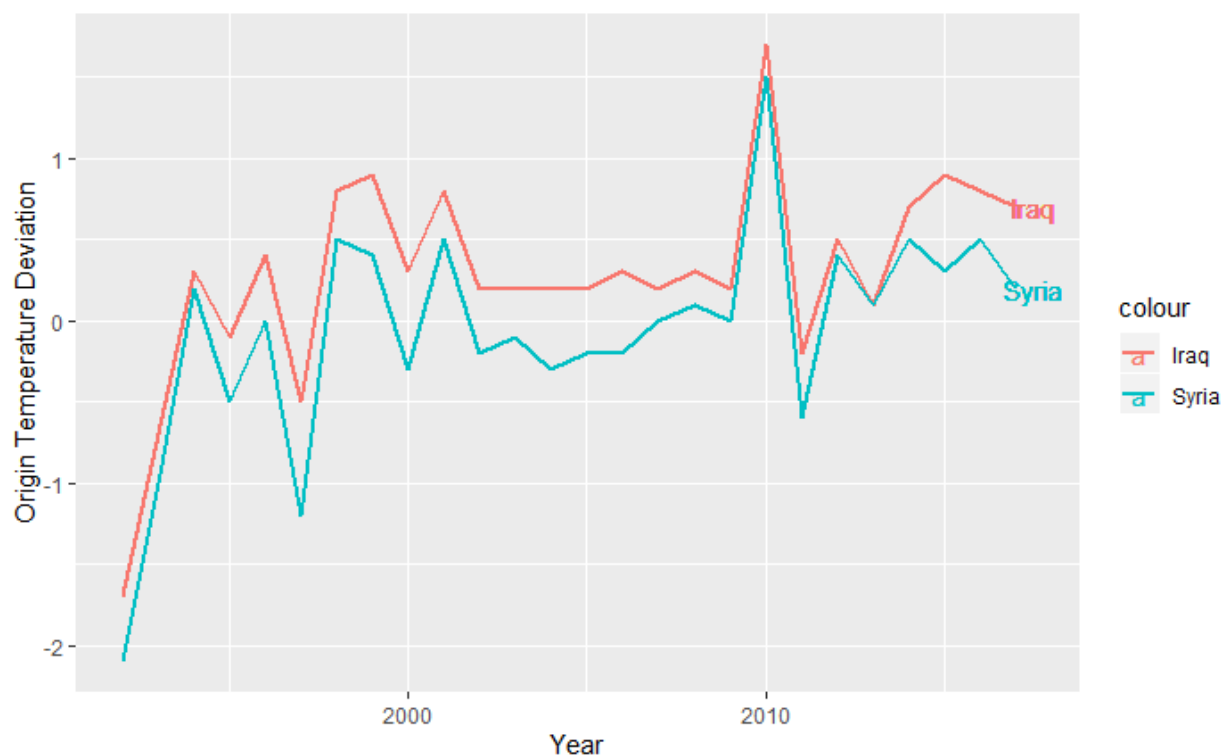
Despite the fact that Syria had previously experienced conflict (including the occupation of Lebanon, which lasted until 2005), the displaced population originating from Syria was nearly zero at the start of the Civil War. By the end of the first year, over 2 million people had been displaced. Unlike Iraq, the number of displaced persons continues to climb, with the figure in 2018 sitting just shy of 13 million displaced persons. Despite having similar populations at the start of their respective conflicts¹⁷³, Syria's displaced population was almost triple the displaced population of Iraq at its peak during the Second Iraq War in 2006.

Comparison

¹⁷³ Iraq's population in 2003 was 25.63 million people, whereas Syria's population in 2011 was 21.08 million. "Iraq," *Trading Economics*, <https://tradingeconomics.com/iraq/population>. "Syria," *Trading Economics*, <https://tradingeconomics.com/syria/population>.

While the figures above provide useful information on domestic conditions during the course of both wars, they are somewhat difficult to compare since they fall along different time periods. For a better sense of what displacement and temperature deviation looked like over the course of the entire data set. First, I examined the temperature deviation pattern for both countries, which is plotted in Figure 5.5 below:

Figure 5.5: Iraq and Syria Temperature Deviation (Degrees Celsius) 1992-2018



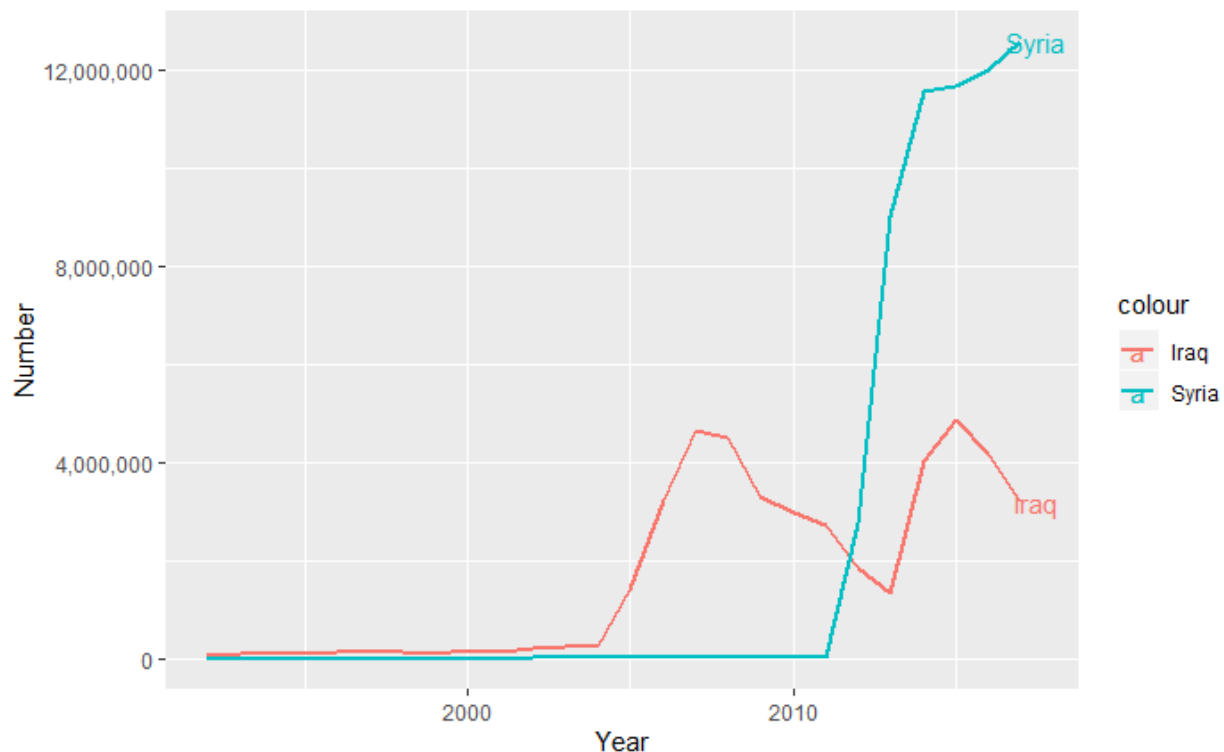
Data From UEA CRU; Figure by Author

While Iraq's temperature deviation is slightly higher than Syria's across the entire period, the two countries trend with each other very closely, including for the 2010 temperature spike. This means that the spike observed at the end of the Iraq War temperature graph in Figure 5.1 also affects Syria. Indeed, this spike in temperatures is considered a major factor in the onset of drought in Syria, which is now cited as one of the factors that contributed to the onset of the

Civil War. This drought has led some to classify the Syrian Civil War as in part being a climate related conflict.

Before continuing discussion of the implications of these data, I examine the comparison between displacement in Iraq and Syria across the same period. These data are plotted below in Figure 5.6:

Figure 5.6: Iraq and Syria Population Displacement 1992-2018



Data From UNHCR; Figure by Author

Neither country had a significant displaced population prior to the onset of their respective wars; insofar as there was displacement in Iraq, much of this can be ascribed to displacement among populations targeted by Saddam Hussein's regime (Kurds, Shia Arabs, etc.) or Iraqis who remained displaced by military action during Desert Storm or the Iran-Iraq War. The second hump in Iraq's displacement graph represents displacement resulting from Daesh's invasion of Iraq from Syria as the organization expanded control of the border region between Syria and Iraq

from 2014-15. As the Iraqi government recaptured territory from the nascent self-proclaimed caliphate, the displaced population began to return to their homes.

Both Iraq and Syria experienced little if any displacement prior to the onset of war. Additionally, both have fallen below the average temperature deviation for the globe during most years. For example, in 2018, global mean temperature deviation was approximately 0.8 degrees Celsius, whereas it was approximately 0.7 degrees Celsius in Iraq and 0.25 degrees Celsius in Syria. The high level of displacement of displacement in Syria relative to Iraq at first seems to indicate that climate change has little effect on displacement in these cases. If it did, it would stand to reason that Iraq should have more displacement than Syria since Iraq's temperature deviation is on average higher than Syria's, and is significantly higher in 2018 despite the fact that Syria's displaced population is more than four times higher than Iraq's in that year.

However, I propose an alternative explanation for these discrepancies. Climate change was already occurring prior to the start of both wars, and yet few citizens of either state were displaced. After the outset of both wars, the displaced population increased dramatically. Part of the difference in the severity of displacement has to do with the conduct of the wars themselves. The U.S. military was able to retake territory from insurgent forces in Iraq more quickly than the Syrian army has been able to (for a myriad of reasons), and violence against civilians was less severe (though present still) in the Second Iraq War than in the Syrian Civil War. In addition to these differences, there are also significant differences in how climate change manifested itself around the time of the outset of the conflicts.

When the Second Iraq War began, deviation from the mean temperature in 1950 in Iraq had recently declined. However, the temperature in the previous year did not deviate significantly from other similar highs in years prior; there was nothing particularly severe about

the effect of climate change in those years. Furthermore, during the early stages of the conflict, the temperature deviation remained incredibly stable compared to the previous decade, remaining between 0.2 and 0.3 degrees Celsius until the spike in 2010. While the displaced population continued to decline during the time of this temperature spike because the conflict was winding down, the rate at which the displaced population was decreasing dropped during this time, possibly as a result of the strain placed on Iraq by the unusual temperature shift. Furthermore, the spike in displacement seen around the time of Daesh's rise also correlates with a rising trend in temperature deviation in Iraq, which could indicate a relationship between the two.

In the case of Syria, the onset of the Civil War and the beginning of mass displacement was immediately preceded by the 2010 spike in temperature deviation. While the spike was not as great as the one in Iraq in absolute terms, the change from the previous year's temperature deviation is equivalent to the once experienced in Iraq. The drought and population transfers caused by this increase in temperatures has been cited by some researchers as helping to instigate the onset of unrest that culminated in the Syrian Civil War. Furthermore, after an initial drop in temperatures in 2011, Syria continued to experience a warming trend for the remainder of the conflict. There has been little resettlement of displaced persons in Syria as of 2018 because hostilities were still ongoing at that time, with the collapse of Daesh's territorial holdings occurring over the course of 2017-2018. Therefore, it is possible that some return is now underway, though the extent to which this is happening if at all is unclear in the presently available data.

The key takeaway from this analysis is not that climate change is always a primary cause of war nor that climate change makes war inevitable. Rather, climate change is a confounding

factor in instances of conflict and can help to precipitate conflict as it gets worse. Temperature spikes like the one that hit Iraq and Syria in 2010 and general climate volatility tends to grow more common and more severe as climate change gets worse. Because of this, at least some of the change in displacement between the Second Iraq War and the Syrian Civil War results from a change in the severity of climate change. This relationship demonstrates that one of the ways in which climate change can affect human displacement is by making conditions leading to armed conflict more severe and by making resettlement and repatriation more difficult during these conflicts.

While the impact of climate change in any given war is difficult to exactly quantify, as climate change grows more severe the displacement in times of war increases as well, leading to higher levels of overall displacement and strain on the institutions that govern displaced persons. It is also important to reemphasize that both conflicts occurred in a region with relatively mild temperature deviation. While the climate in the Middle East is generally high, which could leave it with less wiggle room for temperature deviation than a more temperate region like Western Europe, it is also possible that if wars of a similar size occurred in a region with greater temperature deviation the effects could be even more catastrophic.

Chapter VI: Conclusion

No one leaves home
Unless home is the mouth of a shark¹⁷⁴

Warsan Shire
British-Somali Writer and Poet

In the preceding chapters, I discussed the ways in which climate change can influence displacement as well as what the historical trend in climate induced displacement has been. In

¹⁷⁴ Warsan Shire, "Home," *Care*, https://www.care.org/sites/default/files/lesson_1_-_home-poem-by-warsan-shire.pdf.

this concluding chapter, I discuss the implications of the results of Chapter IV and V in the context of the current legal regime for displaced persons. From there, I make a series of recommendations for how to govern displacement in the context of current progress fighting climate change.

Interpreting Results

When interpreting the results of this study, it is important to look at both the results of Chapter IV and Chapter V. There were two concluding models from Chapter IV, a best- and worst-case scenario model, both of which were based on historical climate and displacement data. Under the best-case scenario, which minimizes the effects of climate change to their lowest possible impact, a 1% change in global temperature deviation corresponds to a 1.51% increase in the global displaced population. Based on the current level of displacement, a 1% increase in temperature deviation (an increase of roughly 0.008 degrees Celsius) would correspond to an additional 1 million displaced persons worldwide given the current global displaced population of around 69.1 million.

Under the worst-case scenario, in which all the possible factors leading to displacement result from climate change, a 1% change in global temperature deviation corresponds to a 2.53% increase in the global displaced population. Based on the current level of displacement, a 1% increase in temperature deviation (an increase of roughly 0.008 degrees Celsius) would correspond to an additional 1.8 million displaced persons worldwide based on the same level of current displacement as the previous model.

As previously discussed, these models are not intended to represent an accurate representation of the causal impact of climate change on displacement. It is likely impossible to parse the exact causal relationship between climate change and displacement because of how

many different factors can contribute to displacement and how many different population stressors are impacted by climate change. These two models instead represent the high and low range of potential impacts on displacement. That being said, it is still likely that both models underestimate the amount of displacement attributable to climate change. This is because the UNHCR's dataset is not a complete accounting of global displacement. Because of the difficulty counting people in logistically difficult situations, the UNHCR's accounting is necessarily an undercount. Additionally, the UNHCR only counts certain categories of displaced persons which excludes displaced persons who do not fall into a protected legal category. While the UNHCR has attempted to address this concern by including counts for stateless persons, asylum seekers, and others of concerns, this does not help in cases where countries underreport numbers or fail to report numbers for particular categories. However, it remains the most complete source of data on displaced persons and as such it is the best means to analyze displacement.

While it is difficult to determine whether the best or worst case scenario model is more representative of the actual relationship between climate change and displacement, it is possible to compare the models to correlation between climate change and displacement over the period covered in this paper. In 1993, the total number of displaced persons documented by the UNHCR was 20.5 million and the temperature deviation was 0.23 degrees Celsius above the 1950 average.¹⁷⁵ In 2018, the total number of displaced persons documented by the UNHCR was 69.1 million and the temperature deviation was 0.8 degrees Celsius above the 1950 average.¹⁷⁶ Over this period, global temperature deviation increased by 263% while the displaced population increased by 237%. However, displacement numbers remained fairly static over the course of the

¹⁷⁵ "Data," *UNHCR*.
 "How do We Know?" *NASA*.

¹⁷⁶ *Ibid*.

1990s despite temperature increases; when looking at the nearly 20 years following this decade, temperature deviation increased by 105% whereas the displaced population increased by 235%. Therefore, over the total period, displacement increased by 0.9% for every 1% increase in temperature deviation and in the most recent two decades displacement increased 2.24% for every 1% increase in temperature deviation.

Considering the higher incidence of protracted internationalized conflicts in the most recent two decades relative to the period of 1992-2000, this seems to indicate that during this period climate change serves as a compounding factor in times of conflict and other crises rather than a primary cause in all cases. This confirms the notion that the worst-case scenario model is likely an overestimate, and for this reason I am using the best case scenario in order to extrapolate potential future displacement outcomes.

Extrapolating Future Displacement

Next, I use this “best case scenario model” to diagram what future displacement could look like. The IPCC projects that warming over the course of this century will reach a level between 2.5 and 10 degrees Fahrenheit or 1.4 to 5.5 degrees Celsius. This is a wide range of potential warming values, and much of the variation between these two values is due to the fact that future warming is dependent on how governments and international organizations respond to climate change.

When the Paris Climate agreement was negotiated, the stated intention of the international community was to limit temperature rise to 1.5 degrees Celsius. However, it remains unclear whether this goal is realistic with current temperature mitigation efforts; the most recent NASA climate projections already put global warming at 0.98 degrees Celsius only

two decades into the century.¹⁷⁷ Many commentators seem to believe that the 1.5 goal is unlikely to be met given current warming and mitigation trends. To understand what global displacement would look like assuming the “best-case scenario model” holds, I created the following figure to map the trajectory of displaced population growth at different levels of warming:

Figure 6.1: “Best Case Scenario” Displacement Projections

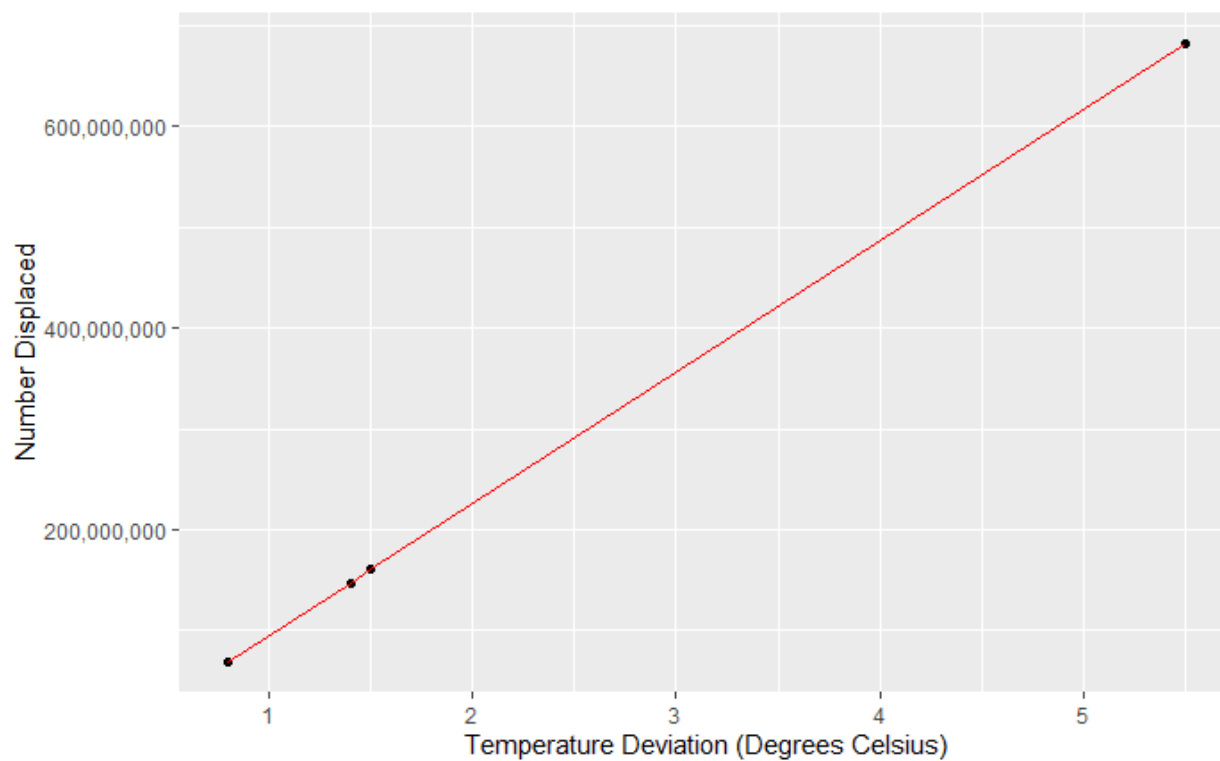


Figure by Author

In this model, the x-axis corresponds to the increase in temperature deviation over 1950 levels.

The starting point is the current level of temperature deviation (0.8 degrees Celsius). The points that follow are for temperature deviation levels of 1.4, 1.5, and 5.5 degrees Celsius. In this model, at 1.5 degrees Celsius of temperature deviation, the global displaced population would

¹⁷⁷ “Climate Change: How do We Know?” NASA.

increase to 147 million people. In a catastrophic level of warming approaching 5.5 degrees Celsius of temperature deviation, this population would skyrocket to over 682 million people.

For reference, I created similar models for cases where the “worst case scenario” held as well as a relationship closer to the correlation between displacement and temperature deviation over the period studied. These figures are displayed below:

Figure 6.2: “Worst Case Scenario” Displacement Projection

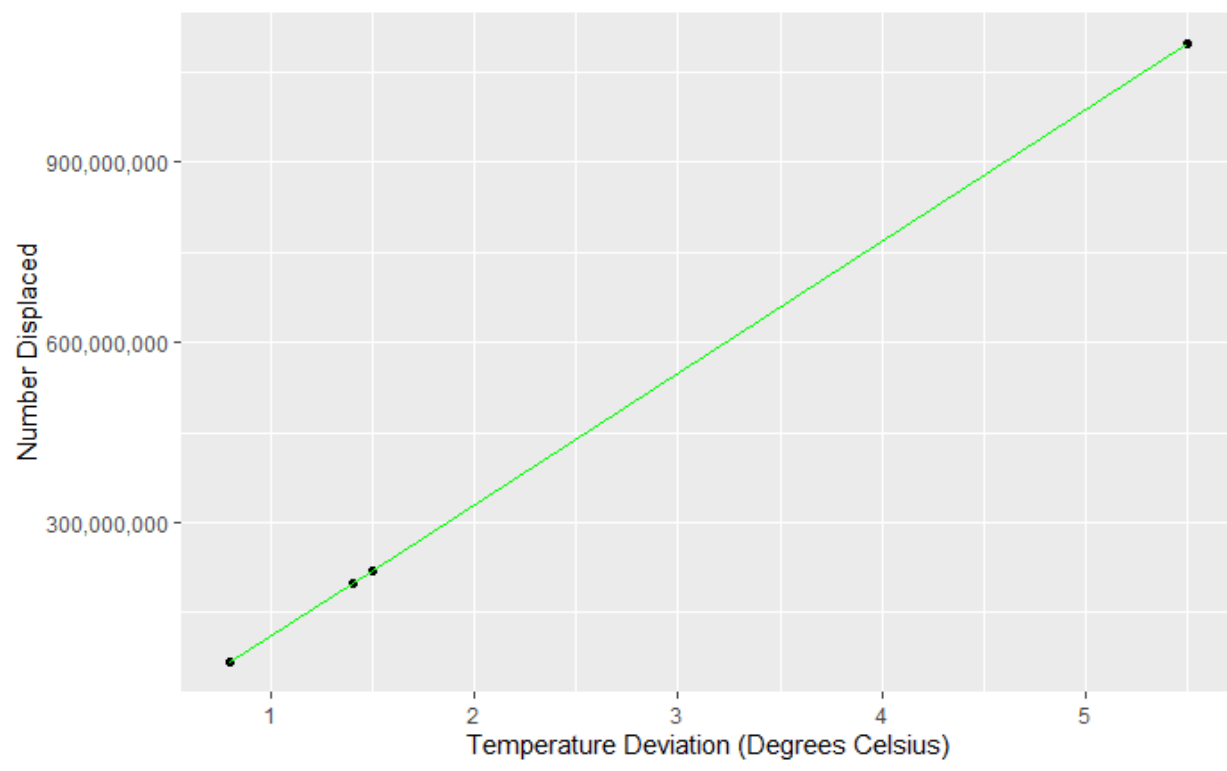


Figure by Author

Figure 6.3: Displacement Projections Based on Displacement-Temperature Correlation (1992-2018)

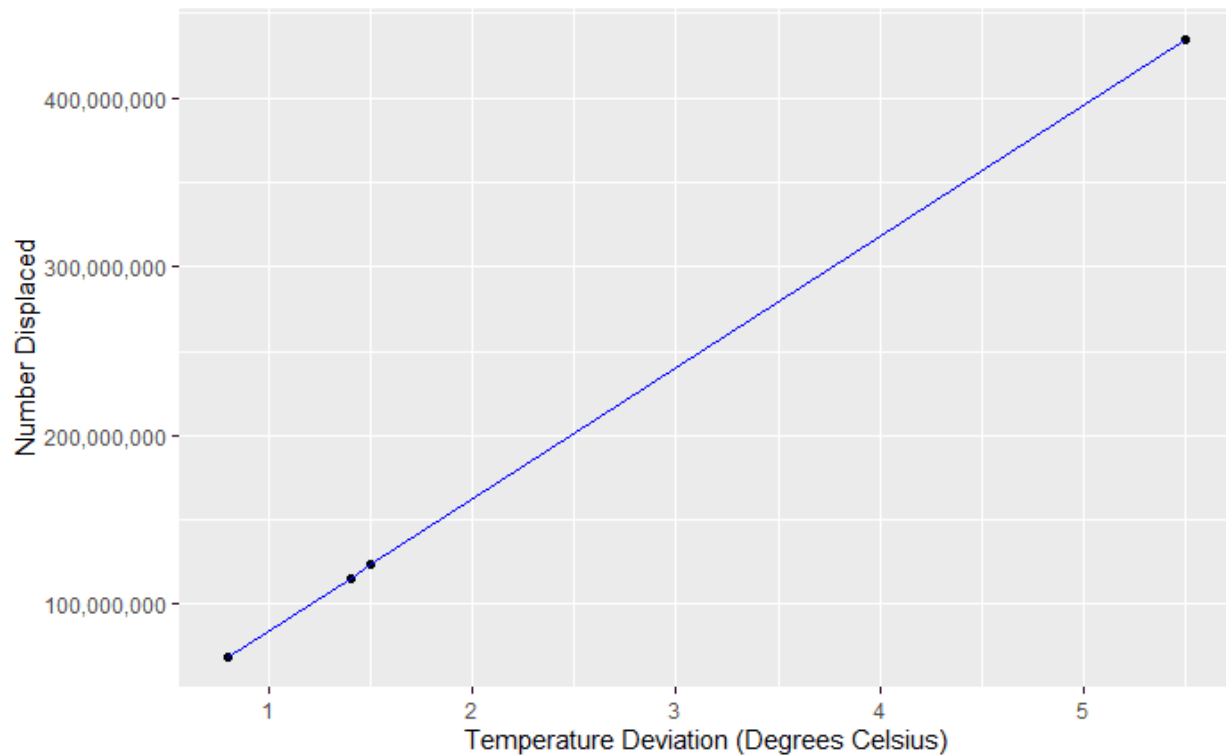


Figure by Author

In these scenarios, the climate projections vary significantly. At 1.4 degrees Celsius of temperature deviation, the displaced population would vary from 115 million to 200 million in the correlation model versus the “worst case scenario” model. At 5.5 degrees Celsius of temperature deviation, the displaced population would vary from 434 million to 1.1 billion in the same two models.

While there is a wide range in potential displacement scenarios, in some ways these different futures represent distinctions without difference. While obviously a world with 1.1 billion displaced persons would be significantly different from a world with 115 million displaced persons, it is important to understand that even the lowest projected values, which would occur in the absolute best case scenario, represent a nearly two fold increase in the

number of displaced persons. This would be a dramatic change for the UNHCR even if it were reached at the end of the century, and at the current rate of warming the Earth could experience 1.5 degrees or more in warming within four decades. It would also mean that the total displaced population would nearly double by the year 2060.

Is the International Community Ready?

When discussing whether or not the world is capable of dealing with this crisis, the primary sticking point is not whether resources for displaced persons *exist* but rather whether the political will exists to make resources available to displaced persons. Context also matters in the treatment of refugees. Disaster response depends on the availability of resources, the willingness to sustain a response, and political factors related to the disaster. This leads to a wide spectrum of responses to disaster that affect how displaced persons are cared for. Even acute disasters like severe storms or earthquakes can have different outcomes based on the willingness to provide resources; consider the effective response to Hurricane Sandy as opposed to the slow, inefficient provision of aid during Hurricane Katrina.¹⁷⁸ In overseas responses such as the provision of aid to Haiti after the 2010 Earthquake, inefficiency and political factors compounded an unspeakable human tragedy from which the country has still yet to recover.¹⁷⁹

Displacement from climate change can manifest as relatively short-term displacement like that resulting from natural disaster, but it can also produce long term or permanent displacement. This is the type of displacement we see in the wake of armed conflict, which could be made permanent in cases where land is rendered uninhabitable by climate change. For this reason, it is more useful to think about the world's preparedness in terms of its recent responses

¹⁷⁸ Susan Cutter and Christopher Emrich, "A Tale of Two Recoveries: 5 Lessons from Hurricanes Katrina and Sandy," *Government Technology*, June 25, 2015, <https://www.govtech.com/em/disaster/A-Tale-of-Two-Recoveries-Hurricanes-Katrina-and-Sandy-.html>.

¹⁷⁹ "Haiti Earthquake Response," *OECD*, February 2011, <https://www.oecd.org/countries/haiti/47501750.pdf>.

to long-term, large scale displacement. A good stand in would be the increased flow of migrants and refugees to Europe that began in 2014 and 2015. This movement of people, which is often characterized as a crisis, saw over 5.2 million migrants and displaced persons arrive in Europe by the end of 2016, many of whom had no official legal status. Part of the reason for this is that they many had no claim of persecution to lodge. Instead, they were fleeing material conditions of deprivation resulting from war, economic stagnation, climate change, and other causes.

Europe and the world failed these migrants and displaced persons in a profound way. Regardless of legal status, many found themselves unable to work and unable to access state services in the countries they arrived in. In many countries, the initial grace period of welcoming and solidarity gave way to right-wing populist backlash against all forms of immigration, which led to the electoral ascendancy of right-wing and far-right political parties in Europe and elsewhere.¹⁸⁰ While the material conditions of migrants and displaced persons improved insofar as they had access to food and shelter in Europe, their economic precarity prevented many from meaningfully engaging in their adopted societies, which led to dislocation, unrest, and discrimination that compounded political resentment. Worst of all, the ineptitude of humanitarian aid and the overwhelming number of migrants created a humanitarian nightmare in the Mediterranean and the countries that border it. Thousands drowned trying to cross the Mediterranean Sea and thousands more were exploited, mistreated, or enslaved in countries like Libya after being forcibly returned or prevented from leaving. Much of the funding provided by the EU for migrants has been used to fund militias and paramilitary groups like the Libyan Coast

¹⁸⁰ Jeffrey Gedmin, "Right-wing populism in Germany: Muslims and minorities after the 2015 refugee crisis," *The Brookings Institution*, July 24, 2019, <https://www.brookings.edu/research/right-wing-populism-in-germany-muslims-and-minorities-after-the-2015-refugee-crisis/>.

Guard to prevent migrants from reaching Europe.¹⁸¹ Narrowly tailoring aid to avoid the political inconvenience of helping migrants in Europe has led to a humanitarian catastrophe in the region.

This response occurred to the movement of around ten million people and included global relocation of migrants with coordination from the UNHCR. In light of this, a future with at least an additional 46 million displaced persons is completely untenable without a radical rethinking of the rights of displaced persons and the responsibility of states to refugees.

On the issue of rights for the displaced, the most important step moving forward is to ensure the proper provision of funding for organizations like the UNHCR. Regardless of the legal status of refugees, proper funding is essential for getting life-saving aid to displaced persons and providing shelter for them in instances where they lack access to it. Assuming that the current budget for the UNHCR is correct (approximately \$125 per displaced person per year), this would mean that the total budget for the organization would have to increase to a minimum of \$14.4 billion from \$8.8 billion to care for the smallest projected increase in displaced persons.¹⁸² For the highest projected number in the worst-case scenario, it would have to increase to \$137.5 billion to provide the same level of funding.

Of course, the reality of the situation is that the UNHCR rarely receives the funding necessary to cover its budget. In recent years, the actual funding has been as little as one sixth of the budgeted funding. Not only does this funding crisis hamstring the organization's ability to properly care for the people already under its care, but it puts future displaced persons in an even more precarious position. For 2020, the UNHCR only has \$1.4 billion in secured funding.¹⁸³ While this amount will hopefully increase, the organization is currently fighting to provide for

¹⁸¹ "No Escape from Hell EU Policies Contribute to Abuse of Migrants in Libya," *Human Rights Watch*, January 21, 2019, <https://www.hrw.org/report/2019/01/21/no-escape-hell/eu-policies-contribute-abuse-migrants-libya>.

¹⁸² "Financials," *UNHCR*, <http://reporting.unhcr.org/financial>.

¹⁸³ *Ibid.*

refugees from Syria, Iraq, Afghanistan and elsewhere on a fraction of its already small budget. Given the ineffective response to migration to Europe in 2015 (when the budgeted amount per refugee was a slightly higher \$133), the current level of spending is wholly inadequate.¹⁸⁴ In order to begin addressing the current and future levels of displacement caused or made worse by climate change, significant investment in refugee care will be vital.

Furthermore, the legal regime governing displacement will have to reimagine the concept of refugee in order to account for this emerging cause of displacement. While previously protection under international law was made conditional on persecution, today's reality demands a reassessment of who receives protection as part of the refugee regime. Principles like *non-refoulement* and granting of asylum are critical to ensuring that those displaced by climate change or climate-influenced phenomena are not further victimized by these forces. These protections should include a right to work in the country of refuge, access to state services in said country, and a framework for the political and social integration of climate refugees should their displacement be permanent. Without meeting these needs, any legal protection would fail to provide for the social, economic, and political ramifications of displacement. It is clear in the aftermath of the European crisis that failure to meet these needs will further compound the vulnerability of displaced populations and create political blowback that could undermine their long-term wellbeing.

Of course, all of this is easier said than done. If there is any other lesson from the European response to the influx of migrants and refugees, it's that modern liberal democracies have significant difficulty addressing the needs of displaced persons without sowing resentment among their constituents. While much of this could be alleviated through proper funding for

¹⁸⁴ Ibid.

refugee organizations and the extension of legal protections and social services to displaced persons, it would likely be politically difficult to do so. Additionally, the ability to galvanize voters using reactionary nationalist or even nativist rhetoric remains a challenge to any plan to expand legal protections to refugees and asylum seekers that exist today, let alone a new class of displaced persons. Furthermore, even if legal protections were afforded to what would be called “environmental refugees” or “climate refugees” there are few enforcement mechanisms to ensure that states abide by principles like *non-refoulement*. The Trump administration has made concerted efforts to minimize the applicability of *non-refoulement* to asylum seekers wishing to enter the United States through Mexico. It is entirely possible that this same treatment could be extended to a future group of climate refugees with the same inability to challenge this treatment or seek recourse.

Of course, failure to address these problems comes at a steep cost. The damage wrought by climate change was done to pay for the industrialization of the developed world; companies and consumers in the United States and elsewhere reaped enormous gains at the expense of the planet. Now, as the damage done approaches the precipice of catastrophe, the price is most likely to be borne by the vulnerable poor the world over. They stand to lose everything because the gains earned fomenting this crisis are not being effectively allocated to adapt to and mitigate climate change or displacement. There is an enormous human toll to this slow-moving destruction. For the tens of millions displaced, thousands if not millions more die from the effects of dislocation and the outright violence of climate change. To quote John Steinbeck once more:

In the eyes of the people there is the failure; and in the
eyes of the hungry there is a growing wrath. In the souls of the people the grapes of

wrath are filling and growing heavy, growing heavy for the vintage.¹⁸⁵

This catastrophe may not be an existential threat to the well-heeled or to the corporations that perpetuate its worst effects. However, to millions of vulnerable people, it has been an existential threat for years, and soon it will be for tens of millions more. Failure to act is a tacit acceptance of the idea that political expediency and the narrow material interests of particular countries and companies are more important than the lives of millions of people. There is more than profound political failure in such an admission; there is moral failure and a complete rejection of agency for the sake of creature comfort. Until states and the international community muster the fortitude to address these threats with a sense of moral obligation and collective solidarity, we have only one future, and it is not a good one. Any livable future requires bold, immediate action, and any politics that accepts the current means of addressing this crisis is woefully unprepared to avert catastrophe.

¹⁸⁵ Steinbeck, 238.

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