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Abstract

Climate change, resource scarcity, and terrorist attacks are ever-growing crises that disproportionately impact different states. They are crises that can impact the stability and resilience of humanity in the following decades if they are not addressed and mitigated. This study addresses the impact of resource scarcity caused by climate change that can then serve as a driving force in terrorist attacks in climate-sensitive and conflict-prone states. The objective of this mixed-methods study is to identify the correlation between climate changes that lead to resource scarcity such as rainfall and surface temperatures with terrorist attacks when taking into consideration other demographic, economic, and political stressors, in the states of Afghanistan, Pakistan, and Syria. This study will obtain time series data between 1989 and 2019 from the following sources: World Bank, Freedom House, UN Database, and the University of Maryland's Global Terrorism Database. The correlation between the independent variables of rainfall and surface temperatures and the number of total annual terrorist attacks per state will be evaluated and compared to the correlation that the control variables (stressors) will have on these documented terrorist attacks. Upon lagging all the variables observed and running a fixed-effects model on STATE to assess the relationship amongst variables, the results proved to be unsupported by the data. Such results were likely attributed to the overall sample size used and limitation of data. However, to further evaluate the trends that exist within the observed variables line charts were created. Such trends further indicated the need for future studies that integrate data from a larger sample size across a greater range of states.

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Chapter 1: Introduction

1.1 Problem

Lush vegetation, bountiful water, and abundant cattle. These are all depicted in artifacts from what is argued to be the origin of human civilizations--the Fertile Crescent. Its copious resources lured many to the region across from the Sumerians to the Babylonians (Lee, n.d). However, the abundance of the Fertile Crescent dwindled as wars were fought, populations flourished, and the Earth warmed. It is almost unfathomable to believe that modern-day Syria was one of the countries nestled in the Fertile Crescent. Today, the world associates the region with images of drought, mountains of rubble, and Syrians fleeing their homeland in makeshift rafts—a stark contrast from its historical roots. Climatologists emphasize that Syria is a prime example of what can occur to other states within the same region (Wendle, 2015). After all, not even the breadbasket of the Middle East was safe.

Changes in rainfall, temperatures, and agriculture cause an overall scarcity of resources, impacting the way humans interact with one another. Throughout history we have seen how environmental changes shaped the way societies obtain resources and how they make use of them. While humans adapt to such changes, socioeconomic equities across the globe do not provide all states with the same opportunities to evolve and adapt. Resource scarcity itself serves as an accelerator to conflict within states when people are unable to obtain such vital resources. This is often the case when scarcities are accompanied by other existing stressors.

Because multiple sub-systems in the environment interact with one another, a change in one component often impacts another. The Center for Climate Change and Energy Solutions (2023), predicts that as temperatures increase with climate change, precipitation rates will also decrease, consequently causing soil and vegetation to dry out. Note that increasing temperatures and changes in rainfall are a part of an ongoing cycle of vegetation depletion, as it decreases

albedo (light reflected by the Earth's surface) causing more heat absorption, and further vegetation depletion (Center for Climate Change and Energy Solutions, 2023). This can cause desertification in regions that were once lush with vegetation; re-enforcing environmental stressors mentioned earlier.

During prolonged periods of drought, soil often becomes more compact, decreasing its percolation and permeability. Therefore, when there are substantial precipitation events, the water does not make its way down the soil horizon as it normally would. These conditions then introduce an environmental hazard of their own: flooding. Flooding can lead to the destruction of infrastructure, loss of lives, and even the depletion of crops (and the possibility of new ones) as nutrients become flushed out by the excess amount of water.

This study draws on the environmental security theory which examines the relationship humanity has with its surrounding environment. The study emphasized how resource scarcity caused by climate change can create the conditions that foster terrorism. Overall, the environmental security theory describes a vicious cycle. As with increasing anthropogenic activities, humanity can be a threat to the environment just as much as the environment can threaten the existence of humanity—blurring the line of what the referent object (Cudworth et al., 2011).

Contemporary environmental security scholarship and its associated definitions have evolved from growing concern regarding the ozone layer, and pollution to that of resource scarcity, regarding anything from fossil fuels to water (Demir, 2022). In the last four decades, the international community has placed a greater emphasis on securitizing the environment as it has begun to significantly interfere with human life (Demir, 2022). However, humans are not novices to environmental changes as they have posed threats to them throughout history. Witness, for

example, the collapse of the Mayan and ancestral Pueblo civilizations after natural climatic shifts made their cities unsustainable. Such civilizations are often believed to have mysteriously disappeared. However, a 2018 study quantified oxygen isotopes found in the sediment of Lake Chichancanab and compared them to proxy data of what would have been the Terminal Classic Period (~800 to 1000 CE) (Evans et al.,2018). The study concluded that the region in the Yucatan Peninsula had a 41-52% precipitation decrease (Evans et al.,2018). Such climate changes likely caused the relocation and sociopolitical changes within the Mayan civilization.

Resource scarcity leaves no one unscathed and is reflected in the availability and prices of everyday goods. The World Economic Forum states that the following five crops are currently being negatively impacted by climate change: cocoa, olives, soybeans, rice, and potatoes (Duncombe, 2018). Such staple foods can drastically lower the standard of living by increasing the cost of living. Underdeveloped states have limited financial resources to combat not only environmental changes but other stressors that impose difficulties on the everyday lives of citizens. The lack of adaptations originates from limited financial assistance that governments allocate toward environmental changes leading to stagnant technological advancements and the ability to bring in imports when resources become scarce. It is important to note that often states in such a predicament are not only located in regions with extreme climates that can be further exacerbated by environmental changes but, are actively combating stressors that create a perfect storm for conflict. Such states include Afghanistan, Pakistan, and Syria.

In developed countries, resource scarcity may impact the price of citizens' favorite coffee. Researchers predict that the cultivation of coffee— an everyday commodity around the globe—will decrease by half by 2050 (The Corner Store Network, 2024). Of course, the scarceness of something in high demand is often accompanied by increasing prices. Yet, while

no one is left unscathed from these shifts in resource availability, there are regions in the world that are impacted disproportionately. For many the price of coffee is something trivial, while for someone in a developing state resource, scarcity shows itself in dry wells, devastated crops, and empty stomachs. While resource scarcity is accelerated by climate change (changes in rainfall and average temperatures), this is only the beginning of such a crisis. There is greater competition for scarce resources exacerbating divisions between ethnic/racial/religious communities as well as further widening the economic gap between rich and poor. In addition, non-state actors may use such tensions to their advantage.

Lack of government aid and mitigation of environmental problems within a causal pathway can yield a perfect formula for violence, specifically by non-state actors. The problem of resource scarcity can become a key component in inducing violent conflict including terrorist attacks. People may turn to such non-state actors to seek support not given by their established government. The ability of these non-state actors to provide aid outside governmental channels in times of need creates an ideal environment for terrorist groups to recruit and operate, leading to additional attacks on governmental and other targets. The Handbook on Children Recruited and Exploited by Terrorist and Violent Groups, posits that young children are often enticed to join extremist efforts by offering them money, food, and even protection (United Nations Office on Drugs and Crime, 2017).

It is important to note that there is not a linear causal pathway between the following phenomena: climate change, resource scarcity, and violent conflict, (in this case specifically terrorist attacks). However, many affected societies already experience severe stress from authoritarian regimes, inequality, corruption, and unemployment. Known factors that can trigger terrorist radicalization and be further exacerbated by climate change and resource scarcity

include infant deaths, net migration, growth domestic product (GDP), and percentage of exports. The following describes how these factors can interact with each other to catalyze a series of unfortunate events.

If there are crop failures due to increasing temperatures and lack of rainfall, there is likely to be a decrease in crop yields and an increase in prices of such agricultural products. This can further escalate the occurrence of malnutrition in expecting mothers and infants. Not to mention that increasing temperatures also allow pests to increasingly destroy critical crops and transmit blood-borne pathogens such as malaria to the infants themselves, boosting the infant mortality rate. Plummeting agricultural yields not only cause malnutrition in infants but can also be a catalyst for unemployment and a decrease in the GDP of a state. In the event of a crop failure, unemployment increases, while GDP and the percentage of exports plummet.

Declining standards of living can induce individuals to migrate to other regions of the state or a neighboring country. However, migration does not guarantee that conditions will improve, especially if migrants' new hope faces the same geopolitical and socioeconomic issues. For example, Syria has accepted an influx of Iranian immigrants despite enduring an ongoing civil war, limited resources, and opportunities. Furthermore, migration itself further exacerbates ethnic and religious conflicts, as is the case between Pakistan and India, or even the Sunni and Shia divide in different parts of the Middle East. Such conflicts escalate as migration leads to a multitude of people with varying backgrounds that must coexist in an already resource-scarce and unstable region.

Identifying the impact of climate change, resource scarcity, and terrorist attacks is fundamental to understanding the instability of a state. These factors' importance is further increased when considering the historical and sociopolitical context that is unique to these three

states of interest: Afghanistan, Pakistan, and Syria. Climate change, resource scarcity, and terrorism all pose a growing threat to national security. Scholars in the fields of environmental science, national security, international relations, and political science all have studied and tackled the problems from their respective disciplines. Environmental and national security crises are often seen as independent of each other. Nonetheless, the interactions between these phenomena will define humanity in the decades to come. Therefore, the impact of climate change and the spread of terrorism should be studied with concern. Scholars should evaluate the problem, to be able to assess the extent to which climate changes that lead to resource scarcity may exacerbate the stressors known to drive terrorist attacks, as well as identify new pathways for radicalization.

In 2021, United Nations Security Council (UNSC) members from 60 countries gathered to conduct an open debate regarding the vulnerability that countries impacted by climate change face in terms of terrorist recruitment. While participants agreed that climate change does not directly cause terrorist recruitment, the consensus was that climate change and its consequences create a "perfect breeding ground for it" (United Nations, 2021). Terrorists can use climate change to their advantage as they can weaponize resources such as water. The Islamic State of Iraq and Levant (ISIL), for example, has been known to utilize water shortages to coerce communities into accepting its rule. In addition, terrorist exploitation of the aid and supplies sent by non-government organizations (NGOs) is common, as group leaders know that aid will not stop coming and they will be the first to use it. Most importantly, it is likely that politically unstable states will have a difficult time mitigating both climate change and terrorism. Drastic climate events-- whether it is unexpected frosts, flooding, or drought-- can all undercut resource availability. Climate-driven crop failures, for example, can cause widespread hunger while

driving the cost of foodstuffs beyond poor families' ability to pay. Governments' inability to control such inflation in turn alienates new groups. If a state cannot deliver resources to citizens, specifically economic ones, many individuals desperate for necessities such as food and medication may turn to terrorist groups that can provide that for them.

While desperation and necessity can present themselves in the lives of people of all ages, it is the youth who are more prone to be recruited into terrorist groups for a multitude of reasons, ranging from desperation to naivete. In states with a high youth percentage, (such as Afghanistan, where the youth make up 60% population) there is an increasing likelihood of the youth being recruited into terrorist groups (United Nations, 2021). It is evident to Security Council members that mitigating terrorist recruitment in climate-vulnerable states is urgent despite the misconnection that many believe exists between the two problems. However, a representative from Norway, Mona Juul remarked that "where vulnerabilities overlap, solutions tend to overlap as well" (United Nations, 2021). It is possible that upon combining such ongoing crises, innovative and effective resolutions can unfold.

It was suggested in an open 2021 Security Council debate that environmental mitigation methods applied via the United Nations might be the most peaceful interference that states could have while terrorism recruitment is still a problem at hand, as it can be addressed less defensively and directly (United Nations, 2021). The Security Council members agreed that one of the difficulties inherent in debating climate change is that it is constantly changing. Supplemental research is needed to further justify the relationship between climate change and terrorist recruitment. After all, "Climate crisis already shapes, exacerbates, and defines the contours of conflict (Prasad, 2021)." It is also crucial to understand that the states that are the most vulnerable to climate change and terrorist attacks do not have permanent representatives on

the UNSC to advocate for their needs and accurately express the conditions of the state. Perhaps representation itself is the root of change.

There have been several studies that assess the links between climate change and violence yet, results across such studies are not always congruent. While many studies prove that there is a positive correlation between climate change and violence, there are mixed results in terms of whether climate change is a direct source of terrorism. This is likely because numerous variables exist within the often-contextualized pathways, and interactions amongst such variables are often not mutually exclusive (Henkin et al., 2022). For example, crop failure and drought often occur in tandem with rising temperatures. In addition, climate change can be experienced differently even within the same state depending on the geography of a region. In Pakistan, for example, the farmlands of Sindh and Punjab Provinces have been most affected by flooding while Baluchistan Province has instead faced record-high temperatures above 120 Fahrenheit. Furthermore, every instance of violence itself is unique in its causes, fatalities, perpetrators, and even the weapon used to follow through with the attack.

1.2 Literature Review

In a 2011 World Development Report titled “Resource Scarcity, Climate Change and the Risk of Violent Conflict,” projected trends in environmental changes and their possible relationship to violent conflict are assessed. The article posits that climate change causes an increase in competition for essential resources such as food and water, especially when taking into consideration global population growth. It is predicted that by 2025 two-thirds of the world will endure conditions ideal for water scarcity and up to 16% of arable land is heavily degraded, and food productivity is on a continuous decline (Evans, 2010). It is important to note that environmental stressors have an impact at all points of conflict. However, legal structures on an

international level may not be able to address such relationships and their impacts (Evans, 2010). Therefore, it is vital to recognize climate change as a problem that should be prioritized and emphasize that its impacts will be more evident in fragile states.

The authors of "Scarcity and Abundance Revisited: A Literature Review on Natural Resources and Conflict," argue that not every single case of resource scarcity yields a type of violent conflict. Despite there being studies that demonstrate the positive relationship between resource scarcity and violent conflict other causal mechanisms must be identified. This includes roles that institutions play in allowing the destabilization of a country, that can then yield violent conflict depending on their financial and political capabilities (Mildner et al., 2011). There is also the challenge of operationalizing central variables and defining what we consider to be scarce resources.

The concept for this thesis was inspired by the 2018 article "Environmental Security" by Joshua Busby. In this piece, qualitative and quantitative studies and their results are reviewed. The article elaborates on the notion that environmental security is difficult to define, as there are varying definitions of security, and the term has been re-defined multiple times (Busby, 2018). Busby then discusses how researchers have operationalized proxy variables to demonstrate that they are causes of conflict (Busby, 2018). Despite the availability of data, there are still mixed results. It is suggested that researchers should take greater consideration regarding the causal factors and perhaps compare regions that do not experience conflict to further emphasize the stark differences between the two and most importantly their distinct causal factors (Busby, 2018). Within all the studies discussed, conflict was the dependent variable yet, terrorism attacks are not a specific type of violent conflict that scholars observe. This leaves a multitude of

research questions to be answered, including how the magnitude of climate change induces violent conflict at different levels and perpetrators.

One key study Busby reviews in this article; “Environmental Scarcities and Violent Conflict: Evidence from Cases,” by Thomas Homer-Dixon, evaluates how environmental changes can cause violent intergroup conflict (Homer-Dixon, 1994). The environmental changes evaluated through case studies were the following: greenhouse-induced climate change, stratosphere ozone depletion, degradation and loss of agricultural land, degradation and removal of forests, depletion and pollution of freshwater supplies, and depletion of fisheries. Homer-Dixon introduces three central hypotheses that help connect the concepts of environmental changes and violent conflict. The first hypothesis describes that when there is resource scarcity there are likely to be interstate conflicts, the second takes into consideration conflict caused by internal migration, and the third focuses on deprivation conflict where economic and social institutions are impacted. (Homer-Dixon, 1994).

In hypothesis one, water scarcity is used as the scarcity variable and was addressed by describing the tensions that existed between Lesotho and South Africa. South Africans had attempted to negotiate with Lesotho in hopes of diverting water, allowing it to enter their state. When negotiations proved to be pointless, South Africa gave support for a coup in Lesotho. They justified this by claiming that Lesotho itself was supporting guerillas from the African National Congress (ANC) (Homer-Dixon, 1994). This conflict was resolved by creating a project to meet South Africa’s water needs, proving that perhaps mitigating water resources in the region was not the initial reason for the conflict, but was an underlying factor that was exacerbating tensions.

The second hypothesis is addressed by assessing how a multitude of people from Bangladesh have settled in India, causing group identity conflicts. This mass migration is attributed to the crop scarcity that has been induced by population growth and flooding in Bangladesh. The third hypothesis centered around economic depreciation and civil strife. This hypothesis brings a greater humanistic aspect to the correlation between resource scarcity and violent conflict. A case study that supported this hypothesis was the dryland degradation in Burkina Faso as degradation leads to a decline in the gross domestic product as there is a loss of both agriculture and livestock. From these case studies, Homer-Dixon (1994) concluded that overall resource depletion proved to have a greater correlation to violent conflict than climate change and ozone depletion. However, the strong relationship between resource depletion and climate change was not thoroughly assessed.

While this article challenges the notion that the environment and its changes are endogenous variables, it acknowledges that environmental damage is detrimental to making economic and political decisions. Given that environmental damage is difficult to prevent and, in some cases,—irreversible—this should be a topic of interest to many. Homer-Dixon argues that if a state cannot prevent or mitigate environmental damage, there is likely to be political instability and hence violent conflict. Although the article described interstate and intrastate violent conflict, there was no mention of conflict sparked by non-state actors. This is worth studying as the presence of non-state actors is often magnified through the support of desperate citizens, who have been misguided in such a resource scarcity crisis by their states. Overall, resource scarcity makes room for violent conflict and pushes out the possibilities for adaptation.

In the article “Beyond Environmental Scarcity: Causal Pathways to Conflict,” by Wenche Hague and Tanja Ellingsen, a mixed cross-sectional study and diachronic analysis was

used to create a logit model. The study concentrated on the years from 1980 to 1992, with an emphasis on deforestation, land degradation, and supply of freshwater observed both independently and in combination with increasing population density, income inequality, and armed conflict. While the study itself draws on case studies, large-scale studies also were used to assess the research question regarding the relationship between the independent variables (deforestation, land degradation, and supply of freshwater) and domestic conflict. Domestic conflict was then separated into two categories: civil war and armed conflict (Hague et al.,1998). The article describes how supply-induced scarcity and demand-induced scarcity are distinct. Yet, these are concepts cut from the same cloth: if there is an increase in population density, then there will be more demand for a resource and hence cause supply-induced scarcity overall.

Hague and Ellingson assessed the hypotheses that states that experienced land degradation, deforestation, and freshwater scarcity were more likely to have conflict than those that did not demonstrate such scarcity. Their second hypothesis was related to demand-induced scarcity in which case states with high population density and income inequality are more likely to have conflict than those that do not have such socio-economic stressors. In addition, regime type and regime stability were also taken into consideration when analyzing the possibility of conflict within a state.

The findings in this study demonstrated that economic development and regime type were a greater indicator of conflict than environmental scarcity (Hague et al.,1998). In addition, there was an increase in domestic conflict in states with environmental degradation. Deforestation and high population density are more likely to be related to armed conflict between states in contrast to civil wars (Hague et al.,1998). The main topic of study was that of environmental degradation and not necessarily climate change, despite their connection. Perhaps

embedding factors of climate change that induce resource scarcity should be further examined, given that there is more indication that there is a strong relationship between them, gathered via research and climate observations since this study was published.

In 1999, a study conducted by the State Failure Task Force (established by the Central Intelligence Agency (CIA) in 1994) corroborated the factors and combinations that would indicate state failure. The CIA report looked at 339 control cases that were randomly selected and evaluated 600 variables, in which 75 variables deemed to be of high priority were selected. In this report, state failure is apparent when there is a revolutionary war, disruptive regime (change in regime), ethnic wars, or genocides/politicides (Etsy, et al., 1999). While the authors found that environmental factors do not directly contribute to state failures, they did find evidence that these factors functioned as "accelerators of crisis (Etsy, et al., 1999)." The report concluded that GDP and infant mortality were useful predictors in terms of indicating state failure. These are important indicators that perhaps should be observed in the same context as environmental factors. As environmental factors can serve as accelerators to state failure, however, high rates of infant mortality can serve as evidence of state failure. It is important to note however, that if there are environmental factors that may lead to malnutrition to both the mother and child, water scarcity for both drinking and sanitary uses can also provoke problems such as illnesses and diseases increasing the chances of infant mortality itself.

Many scholars still perceive a gap between climate change, environmental factors, and conflict. Nonetheless, a news article published by *Scientific American*, "Climate Change and Rising Food Prices Heightened Arab Spring," posits that climate change itself can serve as a stressor leading to conflict (Perez, 2013). This is because citizens of a state can only manage so many stressors at a time. The Middle East was already facing political and economic tensions

and the climate-related food crises that came in 2010 exacerbated them all (Perez, 2013). These circumstances yielded severe instability that allowed for the Arab Spring to occur at that given time and with such strength. This article stems from a compilation of essays from the Center of American Progress titled, “The Arab Spring and Climate Change.”

Specifically, the third essay of the series, “Global Warming and the Arab Spring,” emphasizes the global climate changes that occurred between 2010-2011. Leading wheat exporters: Russia, Ukraine, and Kazakhstan experienced brush fires and severe drought, dwindling the overall amount of wheat that was produced and exported (Johnstone et al., 2023). Similarly, Argentina's soybean and maize crops and Australia’s wheat crops were decimated by severe drought caused by La Niña (Johnstone et al., 2023). Decreases in agricultural supply and their accompanying agflation impact the nations of the Middle East and Africa the most as their arid climate and water scarcity make these regions highly dependent on exports (Johnstone et al., 2023). The essay emphasizes that food scarcity-related riots are not new to such regions, and one should not over-amplify the role climate change had on the occurrence of the Arab Spring, however, the time frame in which such events took place should not be ignored, as such drastic socio-economic changes caused by climate changes are enough to create tensions in any state.

Previous studies have assessed the relationship between climate change and violent conflict, however, there is a lack of empirical evidence when looking solely at terrorist attacks as a form of violent conflict. This is likely because terrorism itself does not hold one globally accepted definition. After all, many argue, one man’s freedom fighter is another’s terrorist. Despite the varying definitions that terrorism holds, it is not the ideologies nor necessarily the goals that subject them to such labels but rather the modus operandi (Armborst, 2010). It is the

deliberate actions against civilians and associated efforts to wield political influence through intimidation that sets terrorism apart from other crimes.

In the article, “Modelling Terrorism and Political Violence,” Andreas Armborst,- argues that there are three unique anomalies of terrorism, which make it a distinct form of violent conflict and do not allow it to belong to the same paradigm as other crimes. The first one is that terrorist-based violence is essentially moralistic violence. Arguably, terrorism holds similarities with other types of crimes and violent conflicts, however, it relies heavily on the reaction that their attacks have, with the hopes of instilling intimidation and fear (Armborst, 2010). The second anomaly describes terrorism as an indirect crime as there is often significant anonymity and collective liability. This is because for a terrorist attack to occur, some sort of terrorist cell is necessary. As cells become larger, both anonymity and collective liability begin to diminish. The third anomaly is that terrorism cannot be prevented or punished by conventional legal measures, as it is indifferent to its target, especially because terrorism can often be state-sponsored terrorism, and its civilians can become targets. Hence, unlike other forms of crimes and violent conflict, terrorist-related activities do not have borders prompting transnational cooperation. Not to mention that terrorist organizations can partake in other forms of crime such as drug trafficking, human trafficking, kidnapping, and extortion to fund themselves.

In the article, “Terrorism as Cancer: How to Combat an Incurable Disease,” by Bryan C. Price, cancer is used as an analogy to terrorism. Politicians have used this analogy significantly as both epidemiological and political crises do not stop at borders and have required billions of dollars to mitigate. The article argues that much like cancer, we still have not been able to find an efficient counterterrorism strategy (Price, 2019). It supports such arguments by establishing the similarities of the causes, behavior, prevention, diagnosis, and treatment of both cancer and

terrorism. In terms of the cause, terrorism, much like cancer, has both external and internal mechanisms (Price, 2019). Terrorists are described to be normal individuals who are radicalized, comparable to how normal cells mutate (Price, 2019). Both terrorism and cancer often behave unpredictably and can metastasize beyond the expectations of experts. The article then builds on the metaphor, describing the spread of terrorism as facilitated by the "bloodstream" of the dark web (Price, 2019). In addition, like cancer, terrorism can only be prevented to an extent by providing access to a better lifestyle through efficient political systems and allowing disenfranchised groups to have a voice.

When comparing the diagnosis of cancer and terrorism, early diagnosis is always an advantage as it gives experts time to make the best decisions possible. The article concludes that the treatment (tactical approaches) of terrorism relies on recognizing that society cannot fully eliminate crises from occurring. Instead, it can prevent them as much as possible by addressing terrorism at all stages (Price, 2019). This article demonstrated the urgency with which higher institutions are always looking for alternative and innovative solutions to an ongoing crisis such as cancer. Given its similar mechanisms to terrorism, such a need for innovation in tactics should be applied, instead of simply relying on military intervention. Overall, experts studying terrorism should not have tunnel vision regarding its origins, as solutions can lie in other overlooked underlying stressors.

In the article "The Climate Change-Terrorism Nexus: A Critical Literature Review," Mavrakou et al. analyze twenty-six articles that look at the relationship between climate change and terrorism and most concentrated their area of study in African countries. The articles that were selected for the literature review must have met the inclusion and exclusion criteria. Such criteria included literature and thematic parameters. Among the twenty-six articles reviewed,

twenty-four concluded that there was a positive correlation between climate change and terrorism. Although terrorism is considered an indirect factor that exacerbates existing stressors, the article assesses that there are four overarching intermediary factors: (1) impacts of climate change on livelihood and economies; (2) impacts of climate change on stability; (3) impacts of climate change on the psychology of individuals; and (4) impacts of climate change on general existing vulnerabilities (Mavrakou et al., 2022). These intermediary factors then impact the rate of terrorist recruitment and the likelihood of terrorist attacks (Mavrakou et al., 2022). The article emphasizes the need to include control variables in quantitative variables and the relationship between climate change and terrorism (Mavrakou et al., 2022). In the sum of the articles reviewed, only "Earthquakes, Hurricanes, and Terrorism" by Berrebi and Ostwald used a variety of variables that interact with both climate change and terrorism. Similarly, this is the path that this thesis takes, as it encompasses demographic, economic, and political variables while taking into consideration a societal and historical context in a different region than what previous researchers have focused on.

Chapter 2: Terrorism Through the Looking Glass

This chapter evaluates terrorism in the states of Afghanistan, Pakistan, and Syria. This section provides important socio-political contexts that may explain any differences in statistical findings and overall trends. While this chapter emphasizes that non-state actors such as terrorists have a similar modus operandi; each state holds its own unique cultural and historical context, which has shaped how domestic terrorist groups have developed. In addition, there have been external factors that have facilitated the presence of terrorist actors and attacks, such as that of foreign intervention.

2.1 Political Instability of Afghanistan

In 1974, Afghan King Mohammed Zahir Shah was overthrown, and Mohammed Daoud Khan became president, creating the Republic of Afghanistan. While Daud Khan himself was not a communist, but rather a socialist, the Republic of Afghanistan established close ties with the USSR; indeed, Moscow may have funded the coup against King Zahir Shah in the first place. This financial agreement allowed for the doors of Afghanistan to be flung open by the USSR, leading to a sharp increase in Soviet aid, including the arrival of Soviet military advisors. The Republic of Afghanistan then collapsed in April 1978 when President Khan was killed in a coup by members of a faction of the People's Democratic Party of Afghanistan (PDPA), a Soviet-sponsored communist group. PDPA leaders signed a friendship treaty with the Soviet Union, in which Moscow pledged to come to the PDPA's military aid if asked. Over the next year, as a rural and Islamist revolt against the PDPA spread, Moscow sent increasing numbers of military advisors. Concurrently, Washington grew increasingly concerned after the U.S. Ambassador to

Kabul, Adolf Dubs, was kidnapped and killed in February 1978. This ultimately encouraging the United States to limit its association with Afghanistan.

The USSR had a prime goal to spread communism to every corner possible to proclaim allegiances and not become an isolated entity due to its communist regime—after all this was the Cold War. The Soviet Union went from influencing Afghanistan and encouraging it to adopt core communist values to fully invading the state in December 1979, claiming their "aid" had been requested. In the process, they killed the current Communist ruler, and installed their follower, Babrak Karmal, as ruler. This prompted U.S President Jimmy Carter to intervene in this proxy war and surge military aid to Pakistani intelligence to give to Afghan resistance (Rashid, 2000). The United States allied with Pakistan to deliver weapons and resources to guerrillas known as the mujahedin ("Holy Warriors") to fight against the USSR troops. Meanwhile, Saudi Islamic radical Osama bin Laden recruited his Islamist supporters willing to fight against the Soviets. This newfound coalition was called: al-Qaeda. Ultimately the USSR overestimated the control it would be able to exercise in Afghanistan, suffering 15,000 dead and 35,000 injured in the decade-long conflict (Taylor, 2014). In 1989, the USSR withdrew its troops amid the ongoing violence, leaving ethnic resistance groups to battle for control.

In 1996, after years of civil war, Pakistan's Inter-Services Intelligence Directorate (ISI) brokered the creation of the Taliban (Pashto for "students"). This alliance of reactionary Islamists from the majority Pashtun ethnic group quickly seized power, declaring Afghanistan to be an "Islamic emirate," ruled by Sharia law. The Taliban welcomed Saudi terrorist leader Osama bin Laden and other terrorist factions in return for their military support against minority ethnic groups battling to control the country's northern provinces (News Desk, 2021). The grasp that the Taliban were able to obtain on the people of Afghanistan stemmed from their

desperation for guidance during the ongoing civil chaos (News Desk, 2021). Afghans embraced the traditional Islamic laws as the Taliban had proposed that they would bring peace as they curbed the ongoing opium trade. Yet, these promises were paid with the price of sovereignty and constraint of women's rights.

Although the Taliban and al-Qaeda were separate entities, they essentially occupied the same region and acted on similar ideologies. However, it was al-Qaeda who became a more notoriously known terrorist group given its direct attacks toward the United States, from the 1993 bombing of the World Trade Center Parking to the 1998 bombing of two U.S embassies in Africa (Clinton Digital Library, n.d). This prompted the Clinton Administration to not only bomb Bin Laden's training camps but also demand that the Taliban extradite the wanted terrorist (News Desk, 2021). The Taliban refused Bin-Laden's extradition, and to return the favor al-Qaeda and the Tunisian Combat Group (TCG) assassinated the head of The Northern Alliance; Ahmad Shah Massoud (Zelin, 2021). Massoud's death came only two days before the deadliest terrorist attack on U.S soil—9/11. This prompted analysts to believe that his death was a calculated part of 9/11 as Massoud would have likely been a direct connection for U.S intelligence. The aftermath of 9/11 would bring about irreversible changes in the relationship between Afghanistan and the United States.

President George W. Bush was prompt to act toward what was infamously coined as 'The Global War on Terrorism.' A month after 9/11, the United States targeted both Taliban and al-Qaeda bases in Afghanistan. While the power of the Taliban dwindled and their territories were taken over by tribal leaders, members of al-Qaeda (including its leader Bin Laden) fled to the mountains between Afghanistan and Pakistan (Council on Foreign Relations, 2024). In 2003, the

shift in Taliban and al-Qaeda presence in Afghanistan led to NATO taking over security in Kabul (News Desk, 2021).

The Bush administration was determined to reconstruct the continuously politically unstable Afghanistan. The U.S. became involved in everything from establishing an interim government to training its Afghan forces. The assistance to Afghanistan continued well into the Obama administration. In May 2011, toward the end of President Barack Obama's first term, Osama bin Laden was killed in Abbottabad, Pakistan. In the following years, American troops began evacuating Afghanistan as it was deemed their presence was no longer imperative to the well-being of the state (given the support Afghans had received for almost two decades). Yet, the training wheels imposed on Afghanistan never truly came off and the Taliban began to gain traction once more, especially in Pashtun-majority rural areas alienated from the central government. Consequently, the United States and the Taliban signed a peace deal in 2019 to garner support against minority ethnic groups battling to control the country's northern provinces (News Desk, 2021). Just two years later, President Joseph Biden completely withdrew U.S. troops from Afghanistan. This left thousands of Afghans desperate to escape as journalists were silenced, schools shut down and women's rights were quickly revoked. Today, the Taliban lead the country of Afghanistan in a strict Sharia law with the hopes of becoming a government recognized by the international community.

2.2 Paradox of Pakistan

Pakistan was not always a conservative Islamist state it is today. Visitors once described it as a contemporary and vibrant state, yet with the onset of coups in 1958, the socio-political atmosphere of the state could not help but shift (Coll, 2004). The metropolitan cities of Pakistan were bursting at the seams as crop failures pushed those in rural regions to seek opportunities

elsewhere and pressure the government for accountability in such losses. In 1971, military ruler General Mohammad Yahya Khan launched widespread massacres throughout East Pakistan after the province's parliamentary candidates swept the national elections. These abuses led to civil war, war with India, and the eastern province's secession of what is now Bangladesh. At this point in Pakistan's contemporary history, Zulfiqar Ali Bhutto took power from 1971-1973 and became the state's first democratically elected prime minister (Oxford Reference, 2023). However, in the summer of 1978,General Mohammad Zia-ul-Haq seized power in Pakistan, jailed, and hung Zulfiqar Ali Bhutto. Zia, a conservative Islamist, sought to rule Pakistan under a strict, Sunni Islamic law.

In November of 1979, Iranian students seized the U.S. Embassy in Tehran taking U.S. diplomats hostage for 444 days, sending shockwaves through the region and inspiring other uprisings. On November 21st, 1979, Pakistani students burned down the U.S. Embassy in Islamabad, Pakistan, killing four (Global Nonviolent Action Database, n.d.). Despite these strains in U.S.-Pakistani relations, on December 28, 1979, President Carter agreed to collaborate with Zia and the ISI to support the Afghan resistance fight against Soviet occupation.

Pakistan has gone through a multitude of challenges and changes, partially due to its geography, as it is scrunched between India and Afghanistan. Two states with a complex history have influenced Pakistan's actions in the international community. While Soviet troops did not occupy Pakistan (unlike Afghanistan)—the KGB and its Afghan allies did sponsor a growing state-sponsored terrorism movement inside Pakistan. In addition, at least three million Afghans sought refuge from the Soviets within Pakistan. This mass migration intensified tensions in the state as there was now more competition for jobs that were often preferably given to Pashtuns (Jones, 2002). As arms from the Afghan war flooded into Pakistan, they were bought up by local

secessionist factions, criminal gangs, and even university student groups. This was an ideal environment for terrorism that would encroach on the country for the following decades.

It is important to note that the borders of Pakistan itself are still the subject of extensive controversy and have been a source of many conflicts, as Pakistan's borders with both India and Afghanistan have never been fully settled. Pakistani military leaders hoped a Taliban regime in Kabul would resolve longstanding border disputes, allowing them to focus more resources on Kashmir. The Taliban benefited from the excess of weapons left over from the anti-Soviet fight, as well as training at the same Pakistani intelligence bases previously used to train Afghan resistance fighters. Indeed, many Taliban leaders—including members of the Haqqani Network (a Sunni Islamist militant organization)-- were veterans of the earlier war with both combat experience and longstanding ties to Pakistani intelligence.

The following decades left Pakistan swaying between the leadership of Prime Ministers Nawaz Sharif and Benazir Bhutto. During Sharif's first term (1990-1993) he incorporated a strict Sharia Law into the legal code of Pakistan and would return to claim the role of Pakistani Prime Minister in 2013 (British Broadcasting Corporation, 2021). In contrast, Bhutto's vision for Pakistan was distinctly more liberal as she led the Pakistan People's Party (PPP). Yet, the Muslim League Party carried a greater power dynamic in the state as it caused both Bhutto to flee (British Broadcasting Corporation, 2021). Sharif and Bhutto represent the indecisiveness of Pakistan in terms of its political path as each Prime Minister had distinct values.

Within this complex political dynamic in Pakistan, the following question lingered: What stance does the country take on regional terrorism that is having an impact across the world? Pakistan had undoubtedly become an intermediary in the Global War on Terror as it offered a geographical advantage to the United States given its proximity to Afghanistan. Not to mention

that it was common ground for the Taliban and al-Qaeda, prompting President Musharaf to support the U.S attacks in Afghanistan in 2001 (British Broadcasting Corporation, 2021). By 2004, Pakistan became significantly more involved in curbing Islamic extremists as it began to conduct offensive missions to al-Qaeda militants near its border. Similarly, the United States began conducting drone attacks in the same region (British Broadcasting Corporation, 2021).

In 2008, Pakistan found itself laboring under an immense debt stemming from loans given by other nations and non-profit organizations. The loans were intended to help the state establish an efficient irrigation system to assist it on its path to economic stability. The combination of a crippling economy and the political party holding power (the PPP winning the 2008 election) sent Pakistan into utter turmoil and prompted tension in tribal areas due to Sunni extremism (British Broadcasting Corporation, 2019). The growing presence of extremists in the country was responsible for a multitude of incidents that projected a negative light on the state. For example, in 2014, school children became the main targets of the Taliban, specifically female students as it is deemed to go against their ideology. Amongst these victims was then fifteen-year-old Nobel Peace laureate, Malala Yousafzai who was shot in the head on her way to school.

By this time in contemporary Pakistani history, Pakistan was a prime focus for counterterrorism initiatives as was a surge in terrorist-related activities. There has been a decline in terrorist attacks in the latter half of the decade, in comparison to 2009 when there were almost 8,000 terrorist-related deaths (Afzal, 2021). Nonetheless, Pakistan is still mitigating the impacts of terrorism and the effect they have on the everyday lives of its citizens. Today in 2023, it is estimated that 65% of all violence-related fatalities in Pakistan result from terrorism (Afzal, 2021).

2.3 Endless Conflict in Syria

Syria's extensive history includes the establishment of some of humanity's first civilizations, making it no stranger to political tension and foreign occupation. In 1982 through 1984, the Syrian Muslim Brotherhood staged a failed uprising and attempted to assassinate President Hafez Assad (The Commission, 2004). The Assad regime nonetheless survived for decades, largely eliminating domestic terror groups for the remainder of the Twentieth Century. Yet, it was evident that there were lingering interests in Islamic extremism within the state in the early 2000s, as there was growing conflict between Shias and Sunni sects, and within the Assad family's own minority Alawi sect. These growing tensions can partially be attributed to the Assad regime's practice of preferentially promoting their Alawi supporters, giving them dominance in the military and security sectors throughout the state (Sergie, 2023). This ultimately fueled the civil war between the Shia and Sunni, and in turn, created animosity within the Sunni toward the Syrian government (Sergie, 2023).

Amidst these ethnic and political tensions, the state of Syria cooperated with the United States and offered the CIA a variety of information pertaining to al-Qaeda activity following the September 11, 2001, attacks on the World Trade Center (The Commission, 2004). Yet, despite this interaction between these states, al-Qaeda was using Syria as a shortcut to settle camps in Iraq. This now made Syria a state of interest in the Global War on Terror in the eyes of the Bush administration and eventually led the United States to impose sanctions on Syria.

Bin Laden was keen on establishing ties with the jihadists fighting U.S. troops and allies in Iraq. Despite the hesitancy from Iraq based al-Qaeda leader Abu Musab al-Zarqawi, (whose initial target was Shia Muslims, not American forces) was given generous funding from Bin Laden, who allowed Zarqawi's group to affiliate with the larger al-Qaeda organization. Yet, Bin

Laden soon condemned this branch of al-Qaeda for their severe violence, and in 2004 the terrorist group was rebranded as the Islamic State of Iraq and Levant (ISIL). After the death of Bin Laden in 2011, ISIL supporters claimed that al-Qaeda no longer represented jihadism and ISIL set out to spread the Islamic caliphate. In 2011, the civil war and ethnic conflicts in Syria left the region in a perpetual state of instability. Such instability proved to be an ideal condition for ISIL to establish its caliphate, or Islamic government. Hence began, the terrorist regime that would reshape the state of Syria for the next decade. As the presence and focus of ISIS proliferated; as did violence and drone attacks across the state, prompting Syrians to flee.

The region occupied by ISIS was not sufficient for their vision of a global caliphate (Islamic state). In 2015, the terrorist organization began expanding through other regions to conduct attacks and recruit individuals (British Broadcasting Corporation, 2019b). Between 2012 and 2016 there were over two thousand suspects arrested in European countries for having jihadist affiliations (Video et al., 2024). France has been heavily affected by jihadist attacks as it has experienced 23 attacks on its soil since 2014 (Vidino et al., 2018). The internet also proved to be a useful tool to recruit ISIS fighters and brides alike, as social media platforms became a prime source for communicating and disseminating propaganda.

Although ISIS has gone through a series of rebranding due to the loss of leadership, its goal to establish an Islamic caliphate has not changed. The state of Syria has been reduced to dust and rubble from the ongoing civil war and drone strikes targeting ISIS leaders. Such conditions have made it practically impossible for the once agriculture-dependent country to thrive, leaving countless individuals displaced. Not to mention that it further exacerbates the refugee crisis as displaced individuals have limited options given the instability in the surrounding region.

Afghanistan, Pakistan, and Syria each have their unique history, yet hold significant interconnections within the world of terrorism. All three states have conditions that can enable the presence of such non-state actors and their attacks. While it can be argued that terrorism itself can exacerbate conditions such as poverty, migration, lack of education, and violence itself, these can also be described as conditions that can shape ideologies within terrorist organizations. The three states highlighted in this thesis are in regions with arid climates that have depended heavily on livestock and agriculture. The environmental conditions and geography of the states left them to be heavily dependent on imports, and the inflation that can come with such dependence. This can create economic strains on the citizens as they have limited options to obtain food and income. When the government fails to provide economic relief, they turn to non-state actors who will. Terrorist organizations will not only train, feed, and clothe their members, but pay them as well. This money can then be sent to members' families or allow them to establish one in the first place. While there are citizens who denounce jihadists and their ways, the youth continue to be a fundamental demographic in their recruitment process. This is judged to be not only due to the lack of opportunities presented to them but also the level and type of education they received.

Given the multitude of problems that the citizens of these states are presented with daily, from famine to violence—education is often not a priority. This likely allows for propaganda and recruitment from terrorist groups to be more efficient as young impressionable minds do not have the foundations to garner contrasting perspectives and may view the gains of joining a terrorist group as greater than the losses. Those who are fortunate enough to obtain an education may often obtain it at the mercy of the terrorists themselves who aim to shape the minds and ideology of the (male) youth as they can later be of service to them. Such institutions include that of madrasas (Blanchard, 2008). Madrasas are religious schools throughout the Middle East that

originated in Baghdad in the 17th century. Although most center their curriculum around the Quran and the principles of Islam, there has been a lot of controversy regarding the West's perception of them. Some have argued that madrasas have been wrongfully associated with Islam extremism (Blanchard, 2008). While not all madrasas promote such ideals, those between the Afghan-Pakistani border have been known to teach strict Islam curriculum as the Taliban (meaning students) supports them. In the 1980s the United States itself funded madrassas believing they would train anti-Soviet mujahideen fighters. Many of these mujahideen later went on to be a part of the Taliban as their training proved to be useful to advance their ideologies. (Blanchard, 2008). The lack of resources and opportunities for the youth makes madrasas appear to be an ideal path for them to take as parents often send their children to madrasas in hopes that they will be clothed, fed, and educated.

The violence that exists within these states due to ethnic and religious conflict can cause desperation and frustration among civilians. Violence yields a plethora of consequences from destruction of infrastructure, contaminating/depleting resources, and most importantly loss of life. These factors combined lead to a poor standard of living altogether. If the government lacks the power and initiative to stop the ongoing violence between domestic groups, civilians may turn to terrorist groups for protection and provide the resources the government fails to give them.

Terrorism has arguably shaped contemporary history in the three states discussed, yet it is important to be aware of the role the international community has had in shaping the geopolitical climate to this day. While these states are not novices to foreign occupation it is not the only stressor that can catalyze instability and conflict. Environmental factors themselves such as changes in rainfall and temperature can have a great impact on the quality-of-life individuals

have, as they can yield resource scarcity and further aggravate detrimental economic, political, and societal problems.

Chapter 3: Environmental Drivers

Past civilizations have depended heavily on rainfall--rituals were performed, and gods were praised for reassurance that the season would be fruitful, as droughts threatened their existence altogether. Humanity's dependency on rainfall has not quite diminished, but neither have the fluctuations in precipitation. While today's technological advancements have allowed humans to mitigate environmental hardships such as changes in rainfall and surface temperature technological innovations can only do so much to mitigate their impacts. This rings especially true when taking into consideration the anthropogenic aspects such as the production of greenhouse gas emissions from automobiles and industrial facilities. Such anthropogenic activities increase surface temperature and accelerate the evapotranspiration rates in regions. Climatologists have linked anthropogenic activities such as the use of automobiles and burning fossil fuels to climate change, as the climate system is described to be synergistic (Kauffman et al., n.d.). The result is that even small, local activities can have an overarching impact on the planet. Nonetheless, the repercussions for such activities are not felt equally throughout regions. It is often those who participate the least in anthropogenic activities that endure the greatest of consequences. The United States alone produced 5.06 billion tons of CO2 emissions in 2022 (Ritchie & Roser, 2024). In comparison, the states of Afghanistan, Pakistan, and Syria--have produced 12.25, 200.2, and 27.64 million tons respectively (Ritchie & Roser, 2024).

This section discusses both rainfall and temperature together as they interact within the Earth's system. Nonetheless, they are essential climate variables that can create a hostile climate as there may be historical floods, heat waves, and extended droughts. Such climates experienced by Afghanistan, Pakistan, and Syria facilitate the development of hardships such as low amounts of rainfall and high temperatures. The intensity of such hardships can be distinct within the same

country as there are geographical variations that can create what are known as microclimates. Microclimates are defined as climates that are between a few feet to a couple of square kilometers apart and become distinct based on geographical surface features, such as mountains, valleys, and rivers (M. Kauffman & Moran, n.d.). This is incredibly important in these states as all three can experience micro-climates due to the presence of mountains. Mountains allow for orographic lifting, in which air ascends to one side and descends the other into valleys. (M. Kauffman & Moran, n.d.). The upwind air often carries with it moist air, prompting rain, whilst the leeward slope carries dry air creating desert-like conditions for up to kilometers from the mountain range itself. This is known as the rain shadow effect. Syria itself has both continental and maritime climates/micro-climates given mountain ranges and coast, causing fluctuations of rainfall and temperature throughout. The characteristics of such climates and their fluctuations within them, in combination with ethnic conflict, overpopulation, migration, and lack of economic opportunities allow states to become hot spots for low resilience (Vision of Humanity, 2023).

3.1 Afghanistan: Drying Land and Declining Agriculture

Afghanistan has endured decades of conflict that has deteriorated the state from within. Such conflicts have hindered Afghanistan from allocating aid to other fundamentals such as resource scarcity caused by anthropogenic activities—exacerbating longstanding problems. Environmental degradation dates to the 1970's the Soviet occupation. During the occupation deforestation was prominent. Forest fires were ignited during combat, and the remaining timber was smuggled for profit, prompting detrimental and long-term environmental impacts (Vision of Humanity, 2023). One of them is a higher possibility of flash floods and mudslides in the event of substantial amounts of rain, due to the lack of vegetation cover. Concurrently, the lack of

vegetation cover decreases the amount of solar radiation that is reflected into the atmosphere (known as albedo), which then causes a rise in surface temperatures.

There has been an average increase of 1.8 degrees Celsius from 1960-2009 in the state's surface temperature, causing grazing land to dry out or become limited, often leading to degradation in general from overuse (United Nations Office for the Coordination of Human Affairs, 2023). The cycle of overuse is evermore exacerbated as fathers leave their land to be divided amongst their sons. With the passing of generations, inherited land becomes smaller and more degraded. This limits economic opportunities and pushes these communities to depend on irrigation as temperatures rise. Meanwhile, the political instability and weakened economy itself have undercut the hydrological infrastructure leading to low amounts and quality of water in previously productive regions (United Nations International Children's Emergency Fund, 2022). This is incredibly concerning when considering that it is estimated that 70-80 percent of Afghanistan's population depends directly on these natural resources to be able to sustain themselves (Vision of Humanity, 2023).

Since 2021, Afghanistan has experienced its worst drought in the last 27 years, with three of its main water sources drying up (United Nations International Children's Emergency Fund, 2022). While some argue that Afghanistan could obtain significant amounts of water from the melting snow from its mountains, lack of infrastructure and mismanagement have prevented this from happening (Vision of Humanity, 2023). With a lack of rainfall and climbing temperatures, the possibility of melting snow to replenish Afghanistan has become less likely. Today two-thirds of all states are impacted by the consequences of drought and are left to be dependent on foreign aid.

Afghanistan is not the only state experiencing this regional drought. Its neighboring state of Iran has also endured the consequences of long-term drought, causing disputes between the Iranian government and the Taliban (Radio Free Europe, 2023). The Iranian government argues that the Taliban's attempt to create dams to mitigate Afghanistan's ongoing drought is a violation of the Afghan-Iranian 1973 Water Treaty Act (Radio Free Europe, 2023). This can further perpetuate conflict in the future as both states struggle to survive the threatening drought.

3.2 Pakistan: Lack of Water The Great Divider

Much like Afghanistan, Pakistan has endured conflict with its neighboring country oh India for water rights (Qureshi, 2017). The states' high population growth rates often cause resource scarcity across all necessary resources, including that of drinking water. While the two states signed the Indus Water Treaty in 1973, the dire need for water continues to pit these states against each other especially as India attempts to create dams that can stop the flow of river water into Pakistan (Qureshi, 2017). While the bordering portion of the state attempts to mitigate water rights with India, Pakistan is withstanding the impacts that come with climate change, including extreme temperatures and extensive droughts.

Rising temperatures are often accompanied by droughts. Pakistan's Sindh Province has experienced severe drought, placing a strain on the state as a quarter of the national agriculture stems from this region (Kumbhar, 2022). Declining agricultural production has a direct impact on the growth of domestic product (GDP) as exports play a pivotal role in the overall state of the economy. Sixty percent of Pakistan's GDP is dependent on solely exports. With wheat and cotton being the state's most heavily regarded exports--after one year of damage from these crops, the state's GDP declined significantly (Government of Pakistan, 2021). Nonetheless, while declining GDP is a significant effect of stagnant agricultural production it is not the only one.

Food shortages and malnutrition are the detrimental repercussions of declining agricultural production. As of 2022, 40 percent of Pakistani households have suffered from food shortages of some sort. (Kumbhar, 2022).

Concurrently, the length of droughts themselves can allow for severe floods to occur as well (Climate Knowledge Portal, 2023). An extensive dry period allows the soil to become more compact and does not allow the percolation of water when a precipitation event occurs. In July of 2022, Pakistan received over 500% of its usual amount of rainfall in the last 30 years (Kumbhar, 2022). These instances of flooding also cause great damage to agriculture as it can cause roots to rot, and vital soil nutrients to be flushed out.

The Germanwatch Organization ranks Pakistan as the 8th state most impacted by climate change from 2000-2019, (Government of Pakistan, 2021). The state only produces .9% of the world's greenhouse gas emissions yet, experiences drastic climate events firsthand significantly and frequently (Government of Pakistan, 2021). Climate change and its consequences have been further aggravated by the lack of environmental consciousness from the Pakistani government (Gizewski et al., 1996). When the government attempts to apply water rationing laws to its citizens given its scarcity—elite citizens in the upper class often brush off such laws, causing growing tensions in the state and frustration amongst citizens who depend on the water to survive and not water their lawns (Gizewski et al., 1996). Beyond ethnic conflicts and terrorist activity, there have been instances where water scarcity itself has driven violent conflict in the state of Pakistan. In 1994, water shortages in Islamabad led to not only protests but the hijacking of water trucks in parts of the city that had been impacted by the water shortage the most (Gizewski et al., 1996). In addition, Pakistani civilians, specifically farmers have been victims of extortion. Gangs often threaten farmers to give them a percentage of their earnings or will

destroy the crops (Gizewski et al., 1996) Such extortion places further strains on the agricultural communities of Pakistan. Even if they can overcome climate change during the growing season, they are still at risk of losing their crops, as dependency of such resources and scarcity itself can be weaponized.

3.3 Syria: From Breadbasket to Desert Difficult to Inhabit

The civil war, drought, and ongoing drone strikes have reduced the state that was once deemed to be the Breadbasket of the Middle East to mere rubble (Environmental Justice Foundation, 2017). Entangled in these hardships is the presence of the terrorist group ISIS—which has become keen on weaponizing water. The weaponization of water proves to be efficient given its scarcity as the state has experienced two long-term droughts over the past twenty years (Vision of Peace, 2023). Such cumbersome conditions have made Syria become one of the least resilient countries in the world (Vision of Peace, 2023).

In addition to rising temperatures and fluctuating amounts of rainfall, a portion of Syria experiences the Maritimes climate making it susceptible to rising water levels and the consequences that come with it, such as receding shorelines, floods, destruction of infrastructure, and crops (Environmental Justice Foundation, 2017). Similar to Afghanistan and Pakistan, Syria's GDP depends heavily on agriculture. In its prime, it was estimated that 38-47% of the workforce was agricultural related (Vision of Peace, 2023). Yet, the environmental conditions have impacted the agricultural sector overall. Between 2007-2008, 75% of Syrian households declared total crop failure (Environmental Justice Foundation, 2017). This led to an influx of migration from rural to urban areas, which were already overpopulated as Iraqi refugees had fled to Syria. Desperation for improvement is a sentiment shared across Syria as countless farms become deserts and over 800,000 people have lost their livelihoods due to the raging droughts

(Sohl, 2010). Such sentiments have aggravated frustration toward the Assad regime, igniting tensions in a state that already has an ongoing civil war. Despite the aid, the government attempts to provide to its citizens, such as food and water rations. There are stressors within the state that have not been addressed by the Assad regime and have further exacerbated the environmental threats that hinder the advancement of the state (Vision of Peace, 2023).

Environmental changes such as fluctuating rainfall and increasing temperatures lead to resource scarcity. This can become a stressor that aggravates others that the state is attempting to mitigate. Such environmental changes cannot be referred to as the sole cause of conflict in a state, in this case, terrorism. Yet, American diplomat Susan Rice said it best, “Climate change is a multiplier (Environmental Justice Foundation, 2017).” Hence, climate change should not be left out of the equation when trying to change a state's trajectory toward resilience.

Chapter 4: Structure of Study

4.1 Purpose

While this study began solely as a quantitative study, there was an extensive amount of research related to the historical and environmental context of each country—shifting it to a mixed-methods study. The qualitative portion complemented the results of the quantitative portion of the study by describing conditions that can be reflected in the results from uprisings to droughts. Similarly, the quantitative results further emphasized important historical and environmental events. It is important to have both a quantitative and qualitative component to further enhance the purpose of the study.

This is a mixed-methods observational study assessed if environmental changes intensifying resource scarcity are driving factors of terrorist attacks when considering other stress factors that are deemed to have a higher explanatory power. This study focuses on the cases of Afghanistan, Pakistan, and Syria. The three states have experienced not only environmental changes and resource scarcity but also extensive terrorist attacks within their borders. They were deemed to be ideal states to be observed because of this combination of factors. While there are numerous reasons for terrorist attacks and overall violence occurring in these states such as economic, historical, religious, and ideological contexts; environmental changes that lead to resource scarcity should not be overlooked.

Currently, we are still witnessing the impact that terrorism has on a global scale. Because of this, governments invest endlessly in counterterrorism efforts that emphasize defensive and offensive strategies, often leaving out other pivotal underlying factors that can drive such attacks. Overall, this study will assess the relationship of climate changes (rainfall and surface temperature) that lead to resource scarcity and the relationship they have with terrorist attacks.

The study will also include demographic, economic, and political variables considered to be primary driving factors of terrorism. Data to conduct this study will be obtained from the World Bank, Freedom House, United Nations and the University of Maryland's Study of Terrorism and Responses to Terrorism (START) database.

4.2 Methodology

This study is a mixed-methods study that utilized multi-regression analysis to assess the correlation between proxy variables presented in a time-series cross-sectional dataset that indicates climate change and their correlation to terrorist attacks. The study included economic, political, and demographic variables as they can all serve as control variables. The next section will further entail regions of focus for the study as well as the operationalization of variables, the database where they are derived from, and their level of measurement.

Note that climate itself is not a system itself but rather used to describe the state of the Earth's system (Kauffman et al., n.d.). Within the system changes are relatively common, still, it is important to be sensible of the difference between climate change and climate variability when discussing the study of climatology as they can often be used interchangeably. While both are impacted by internal (natural events) and external (anthropogenic activities), climate variabilities are defined to be changes in the average climate in a shorter span of time yet, more than a singular weather event (M. Kauffman & Moran, n.d). In contrast, climate change is the changes in the system that are persistent over decades (M. Kauffman & Moran, n.d). This is the focus of the study, as there is likely to be climate variation in the states of interest. However, persistent changes in precipitation and temperature have been recorded and observed for decades. Therefore, the proxy variables used for climate change are average annual rainfall measured in

millimeters (mm) and average annual surface temperature measured in degrees Celsius (Cº) as those are terms most used to describe climate (Gutzler,2004).

The following stressors will be used as control variables as they are part of the causal pathway that leads to terrorist attacks: infant mortality, net migration, GDP growth, percentage of merchandise exports to economies in the Arab World, political rights, and civil liberties. The multiple regression analysis will also demonstrate the difference in correlation between the independent variables and control variables, in relation to terrorist attacks. Out of the many countries that are in critical regions and experiencing conflict in the form of terrorist attacks, this study will focus on the following states: Afghanistan, Pakistan, and Syria. These three cases were selected due to similarities in their climate, geography, and their overall geopolitical climate. In addition, these states have been enduring not only the consequences of climate change but have also endured terrorist attacks from different perpetrators.

This study will look at data from the years 1980-2019, as data was available for all variables and states of interest. The start date was chosen based on the judgment that going back further would decrease the likelihood of finding consistent data across the entire study. The cut-off year chosen for this study was 2019 as the COVID-19 pandemic could shift results, and even impact the collection of data due to the lack of mobility of supplies, resources, and individuals. There will be 38 years observed per state, therefore the study will have a sample size of n=114.

The World Bank was the primary database for the study as it provides reliable data. The database has well-established guidelines regarding the collection and dissemination of data. The World Bank's mission is to make global data accessible and aid countries who lack resources to publish data, as they recognize the importance that data can have on the decisions governments make. In addition, the World Bank works closely with other international organizations such as

the United Nations (UN) and the International Monetary Fund (IMF). Data obtained from the World Bank database (specifically the World Bank Climate Knowledge Portal) for both the proxy variables (average annual rainfall (mm) and average annual surface temperature C^{o}) and the following control variables (infant mortality rate, net migration, and percentage of exports to the Arab world), were obtained from the World Bank Database (The World Bank, 2023). These variables were chosen from the same database to maintain consistency as they are likely to have a similar data collection methodology even if the data is from an external database, given the established standards. The level of measurement for these variables was that of ratio.

The per capita GDP data was obtained via the UN database (United Nations Data, 2023). This UN database is sourced from the United Nations Statistics Division which oversees the National Accounts Main Aggregate database that is updated annually. (UNSD). The UNSD's overall mission is to facilitate statistic-led efforts on an international level. While it has complete main aggregates of Gross Domestic Products at current market prices, estimates are generated when data for a particular year is not available.

The other two control variables included in the study are political variables of political rights and civil liberties. This information is readily available through the Freedom House Dataset (Freedom House, 2023). Freedom House produces an annual global report that assesses political rights and civil liberties in 195 countries. The methodology used to rate political rights and civil liberties held by individuals is based on the 1948 Universal Declaration of Human Rights. Freedom House operates with the assumption that standards entailed in the Universal Declaration of Human Rights apply to all countries being observed. Political rights and civil liberties are rated on a scale from one-to-seven , with one representing the highest degree of

freedom and seven the lowest (Freedom House, 2023). The level of measurement for these two variables is that of interval.

The Global Terrorism Database (GTD) is maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START). GTD emphasizes that two of the following criteria must be met: (1) there must be a political, economic, religious, and/or social goal, (2) actions are intimidating and or coercing more than the direct and intended victims, (3) the perpetrator's actions target civilians. The data for the number of terrorist attacks that occurred in each state of interest annually is obtained from the Global Terrorism database, as it provides accurate and updated information on terrorist attacks across the years in which the study is observing. The level of measurement for these variables was that of ratio. Because this would be a time-series dataset, the states would be dummy coded. The states could be coded as the following: 1 (Afghanistan), 2 (Pakistan), 3 (Syria).

It is important to take into consideration that limitations exist within the data as there may be inconsistency in the reporting process of infant deaths, migrants, and unemployed individuals. There may also be years with no available data. For instance, the START Database has no record of terrorist attacks in 1993 for any country, as the system crashed, and data was never recovered. Furthermore, the three cases being observed are war-prone states that can then influence the collection of data overall. For example, rainfall and temperature are variables used as proxy variables as they are indicators of climate change, and GDP growth, Merchandise exports to economies in the Arab World (% of total merchandise exports), net migration, and infant mortality serve not only as control variables for resource scarcity, but as proxy variables for resource scarcity. This is because it is difficult to obtain long-term data for resource scarcity variables, especially in states considered to be unstable. This study also takes into consideration

that variables are a part of one system and the quantity of a particular variable in a year can impact the quantity of that variable in the following year. Therefore, it would be necessary to lag all variables observed in this study.

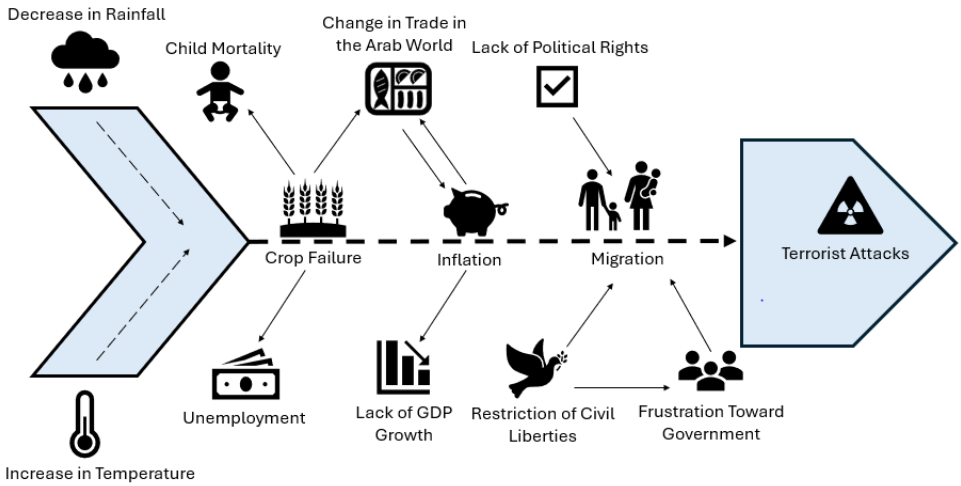

Figure 1: Fishbone Diagram. Relationship and interaction amongst environmental variables that cause resource scarcity and political, economic, demographic variables.

Figure 1 was created to simplify the intricate relationship that intertwined the variables observed in the study. The figure depicts how climate change reflected in rainfall and temperature changes can cause crop failure. Such crop failure can lead to malnutrition in infants, unemployment, and a decrease in GDP and inflation. These stressors not only encourage terrorist activities as they may accept aid from terrorist groups increasing their power and influence but can also serve as push factors for individuals often making them migrate. Migration itself can serve as a stressor as it can further intensify existing ethnic/racial/religious conflicts and provoke terrorist attacks. In addition, restrictions on civil liberties and lack of political rights can garner frustration toward the government and encourage terrorist attacks. Vice versa—the presence of terrorists can lead to infringement on civil liberties and political rights. While the figure includes

control variables that directly impact one another, mediating variables are not explicitly stated. Some of these concepts are further elaborated and emphasized in Chapter 2: Terrorism Through the Looking Glass, as historical and cultural context can often create mediating variables.

4.3 Data Analysis and Results

Once all the cross-sectional time series data from the states of Afghanistan, Pakistan, and Syria from the years compiled from 1980-2019 a fixed-effect model was run on the statistical program STATA. The fixed-effect model will essentially evaluate the net effect of the predictors across time (Princeton University Library, 2023). This would demonstrate the strength of the relationship between the independent variables (precipitation and surface temperature) and the control variables (infant mortality rates, net migration, percentage of exports to the Arab world, GDP, political rights, and civil liberties) to the dependent (number of annual terrorist attacks). The following tables are the results from STATA regression analysis.

Table 1

Multiple Regression of Predictors and Terrorist Attacks combined in Afghanistan, Pakistan, & Syria from 1980-2019

	B	p	Standard Error	95% CI
Pakistan	169.85	0.79	639.39	-1092.2 — 1431.98
Syria	-1206.33	0.001	343.43	- 18887.44 — - 525.44
Rainfall	0.79	0.225	0.647	-0.49 — 2.07
Surface Temperature	-61.6	0.459	82.97	-226.12—102.93
Net Migration	-0.0001	0.025	0.00005	-.000 —.00001
Infant Mortality Rate	-13.5	<.001	1.94	-17.38 — -9.69
Civil Liberties	74.4	0.34	77.59	-79.49—228.29
Political Rights	-123.28	0.008	45.71	-213 — -32.6
Gross Domestic Product	0.105	0.28	0.097	-.086 —.29
% of Exports to the Arab World	5.06	0.095	3.00	-.89 —11.0

Note: The state of Afghanistan was used a reference country, to assess the number of terrorists attacks the country of Pakistan and Syria experienced in comparison to Afghanistan itself. Table 1 shows the Regression co-efficient (B), p-values (p), Standard Error, and 95% Confidence Intervals (CI) a multi-regression analysis of Country, Total Rainfall, Average Surface Temperature, Net Migration, Infant Mortality Rate, Civil Liberties, Political Rights, Gross Domestic Product, and Percentage of Exports to the Arab World for Terrorist Attacks in the states of Afghanistan, Pakistan and Syria combined. The state of Afghanistan was used a reference country, to assess the number of terrorists attacks the country of Pakistan and Syria experienced in comparison to Afghanistan itself. (R^2=.053, p=.05, n=114).

Table 2

Multiple Regression of Predictors and Terrorist Attacks in Afghanistan from 1980-2019

	B	p	Standard Error	95% CI
Rainfall	0.608	0.584	1.09	- 1.63 — 2.85
Surface Temperature	-26.46	0.775	91.6	- 213.65 — 160.92
Net Migration	-0.00004	0.334	0.00004	- .001— .00004
Infant Mortality Rate	-9.88	<.001	1.58	-13.13 — - 6.63
Civil Liberties	430.9	0.117	271.3	- 116.08 — 993.93
Political Rights	-300.45	0.286	276.24	- 865.43 — 264.53
Gross Domestic Product	2.804	<.001	0.355	2.07— 3.53
% of Exports to the Arab World	-26.03	0.227	21.1	- 60.20 — 17.13

Note: Table 2 includes the Regression co-efficient (B), p-values (p), Standard Error, and 95% Confidence Intervals (CI) of a multi-regression analysis of Total Rainfall, Average Surface Temperature, Net Migration, Infant Mortality Rate, Civil Liberties, Political Rights, Gross Domestic Product, and Percentage of Exports to the Arab World for Terrorist Attacks in the state of Afghanistan. (R^2=.89, p=.05, n=38).

Table 3

Multiple Regression of Predictors and Terrorist Attacks in Pakistan from 1980-2019

	B	p	Standard Error	95% CI
Rainfall	0.36	0.794	1.37	- 2.44 —3.17
Surface Temperature	-123.7	0.531	195	- 522.71—275.20
Net Migration	-0.00001	0.583	0.0001	- .0004 —.0002
Infant Mortality Rate	-10.68	0.123	6.72	- 24.43 —3.05
Civil Liberties	-150.18	0.167	105.8	- 366.76 —66.39
Political Rights	-136.47	0.016	53.4	- 245.71— -27.23
Gross Domestic Product	0.6	0.221	0.47	- .38 — 1.58
% of Exports to the Arab World	67.7	0.019	27.1	12.21—123.36

Note: Table 3 includes the Regression co-efficient (B), p-values (p), Standard Error, and 95% Confidence Intervals (CI) of a multi-regression analysis of Total Rainfall, Average Surface Temperature, Net Migration, Infant Mortality Rate, Civil Liberties, Political Rights, Gross Domestic Product, and Percentage of Exports to the Arab World for Terrorist Attacks in the state of Pakistan. (R^2=.64, p=.05, n=38).

Table 4

Multiple Regression of Predictors and Terrorist Attacks in Syria from 1980-2019

	B	p	Standard Error	95% CI
Rainfall	0.144	0.311	0.139	- 0.14 — .42
Surface Temperature	22.37	0.246	18.9	- 16.30 — 61.0
Net Migration	-0.00007	0.034	0.00003	- .0001— -6.06e-6
Infant Mortality Rate	3.73	0.119	2.32	- 1.022 — 8.48
Civil Liberties	72.39	0.133	46.8	- 23.34 — 168.13
Political Rights	-7.58	0.825	34	- 77.12 — 61.95
Gross Domestic Product	-0.002	0.938	0.026	- .055— .051
% of Exports to the Arab World	4.8	<.001	0.604	3.57 — 6.04

Note: Table 4 includes the Regression co-efficient (B), p-values (p), Standard Error, and 95% Confidence Intervals (CI) of a multi-regression analysis of Total Rainfall, Average Surface

Temperature, Net Migration, Infant Mortality Rate, Civil Liberties, Political Rights, Gross Domestic Product, and Percentage of Exports to the Arab World for Terrorist Attacks in the state of Syria. (R^2=.85, p=.05, n=38).

The data was then transferred to the statistical program SPSS to formulate line charts. These charts would help highlight trends in all the variables and within the states of interest. However, because all the variables had different units, their z-scores (standard deviations) were calculated to facilitate placing different variables in one line chart. The charts were used to observe changes among variables within each state.

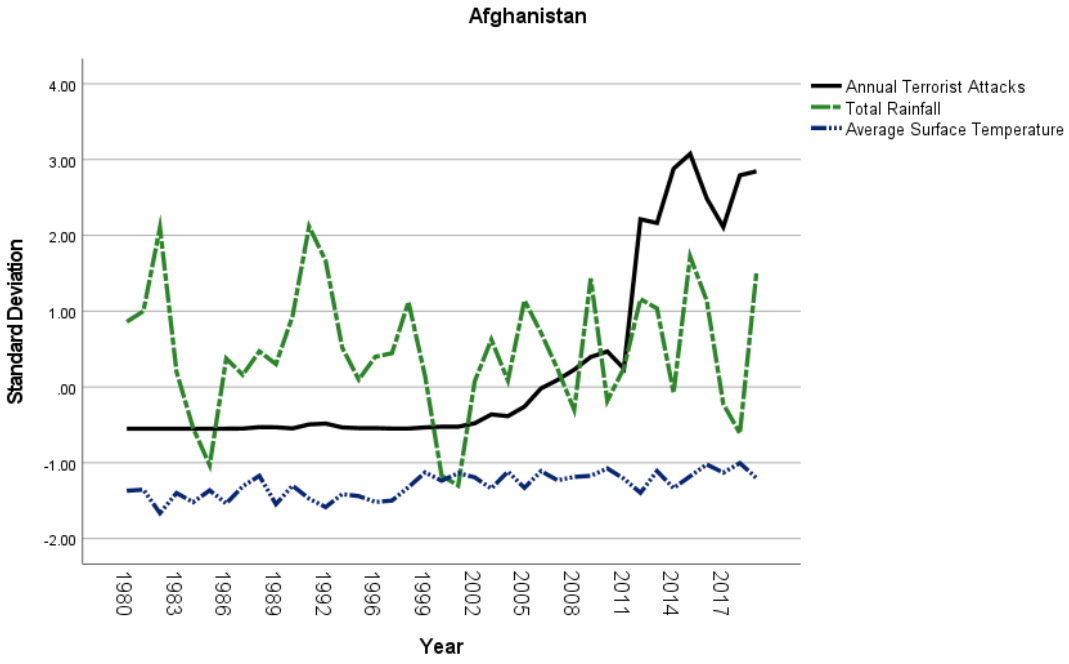

Figure 2: Standard Deviation changes in Annual Terrorist Attacks, Total Rainfall and Average Surface Temperature in Afghanistan from 1980-2019.

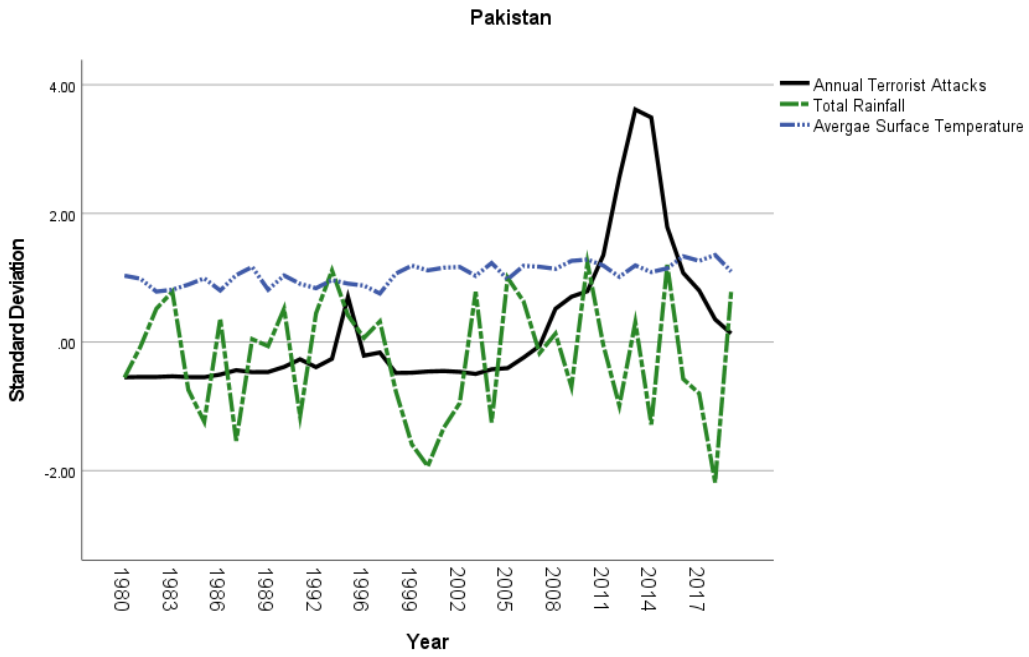

Figure 3: Standard Deviation changes in Annual Terrorist Attacks, Total Rainfall and Average Surface Temperature in Pakistan from 1980-2019

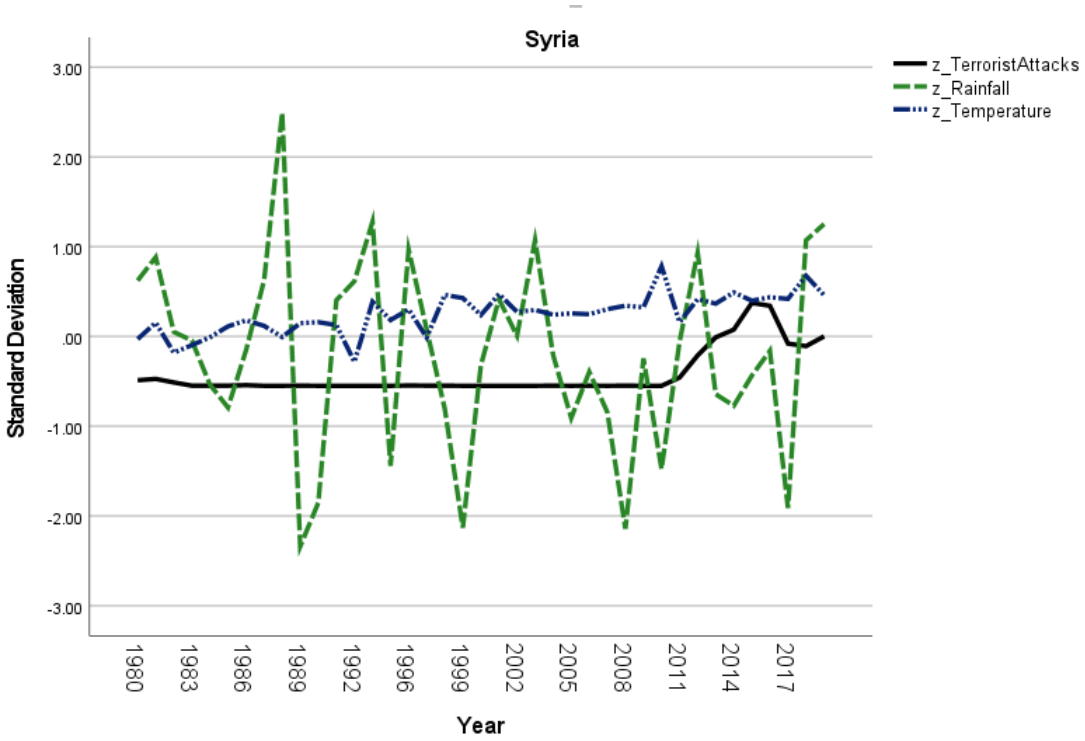

Figure 4: Standard Deviation changes in Annual Terrorist Attacks, Total Rainfall and Average Surface Temperature in Syria from 1980-2019

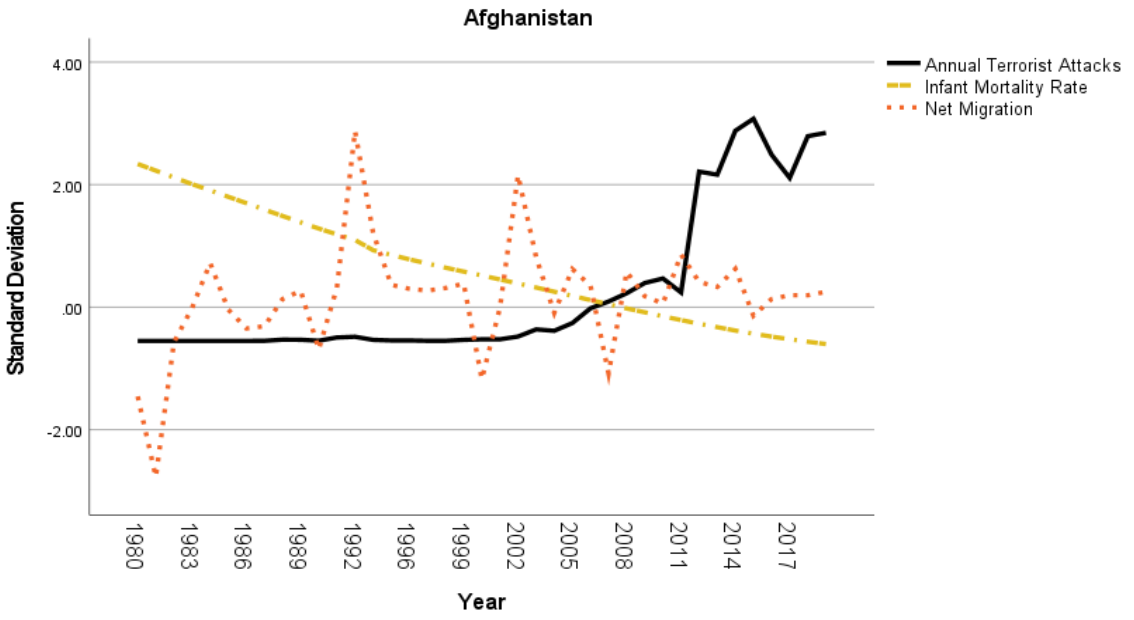

Figure 5: Standard Deviation changes in Annual Terrorist Attacks, Infant Mortality Rate, and Net Migration in Afghanistan from 1980-2019

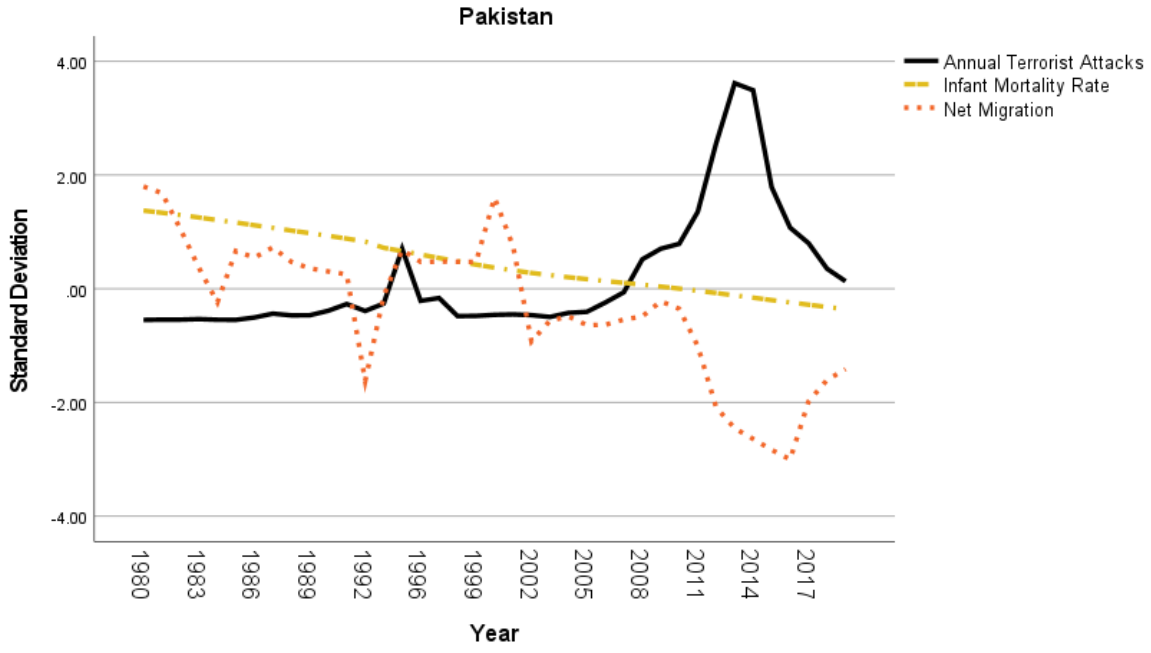

Figure 6: Standard Deviation changes in Annual Terrorist Attacks, Infant Mortality Rate, and Net Migration in Pakistan from 1980-2019.

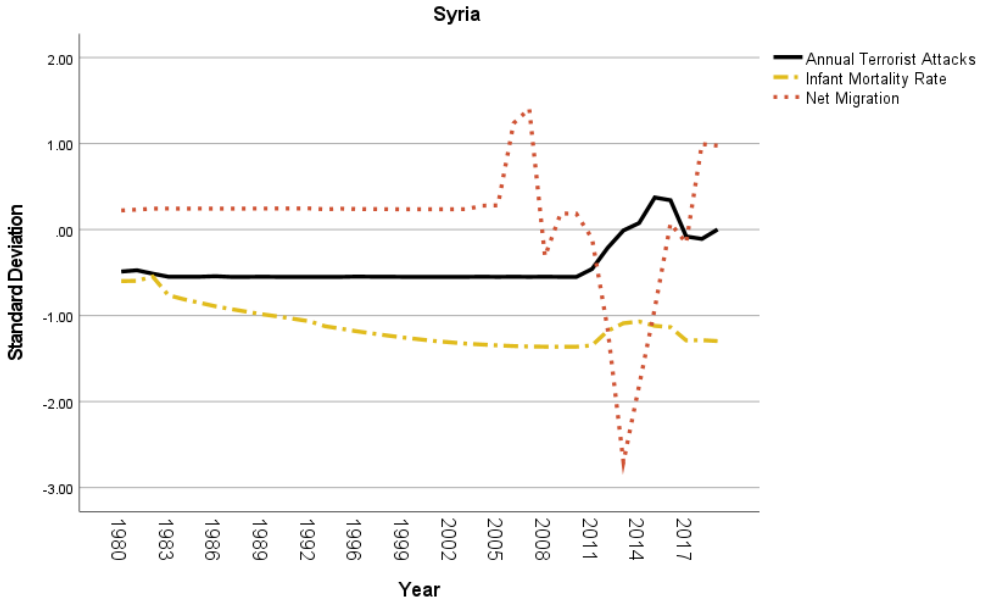

Figure 7: Standard Deviation changes in Annual Terrorist Attacks, Infant Mortality Rate, and Net Migration in Syria from 1980-2019.

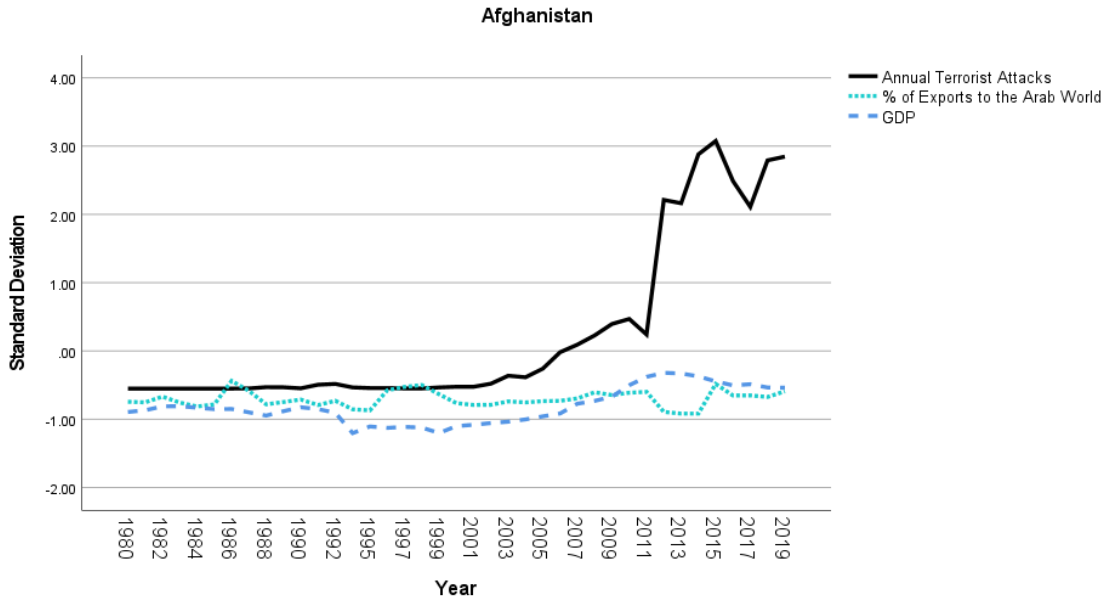

Figure 8: Standard Deviation changes in Annual Terrorist Attacks, Percentage of Exports to the Arab World, and GDP in Afghanistan from 1980-2019

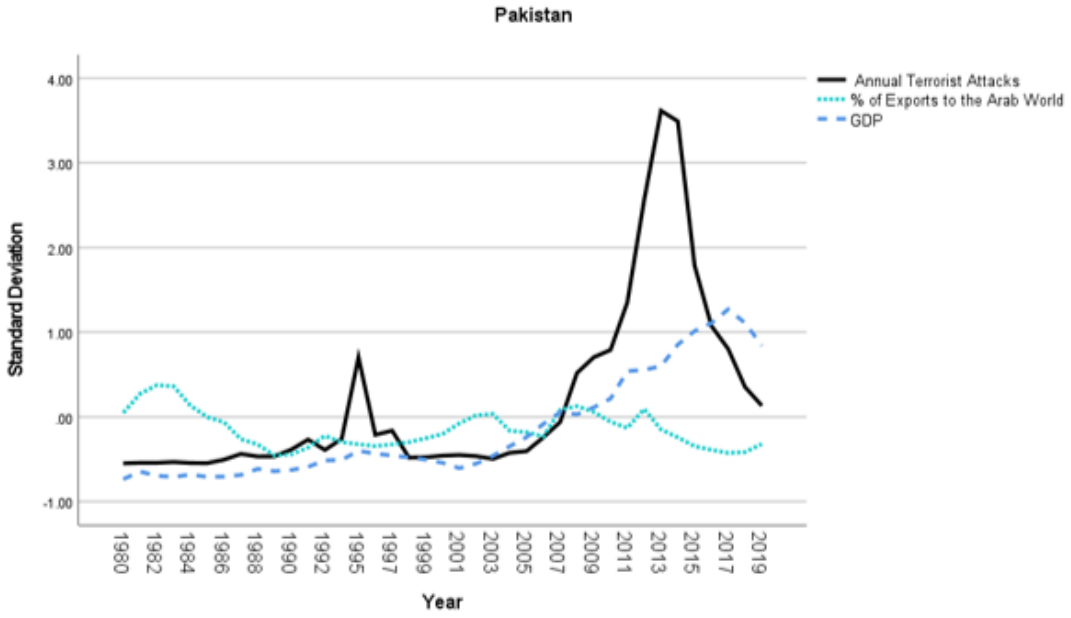

Figure 9: Standard Deviation changes in Annual Terrorist Attacks, Percentage of Exports to the Arab World, and GDP in Pakistan from 1980-2019

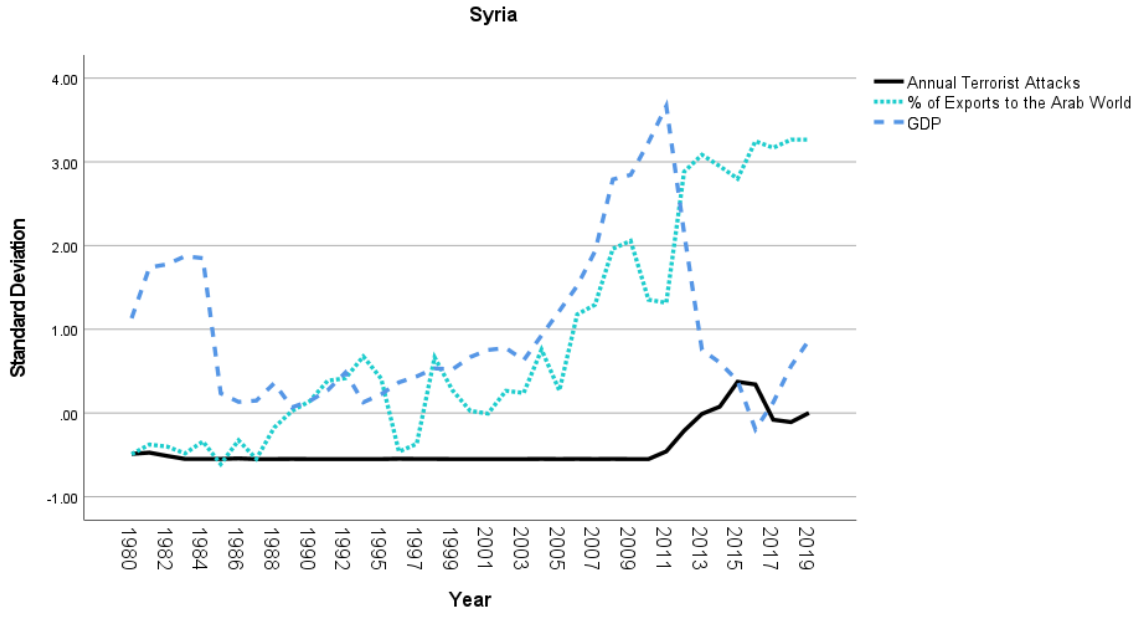

Figure 10: Standard Deviation changes in Annual Terrorist Attacks, Percentage of Exports to the Arab World, and GDP in Afghanistan from 1980-2019

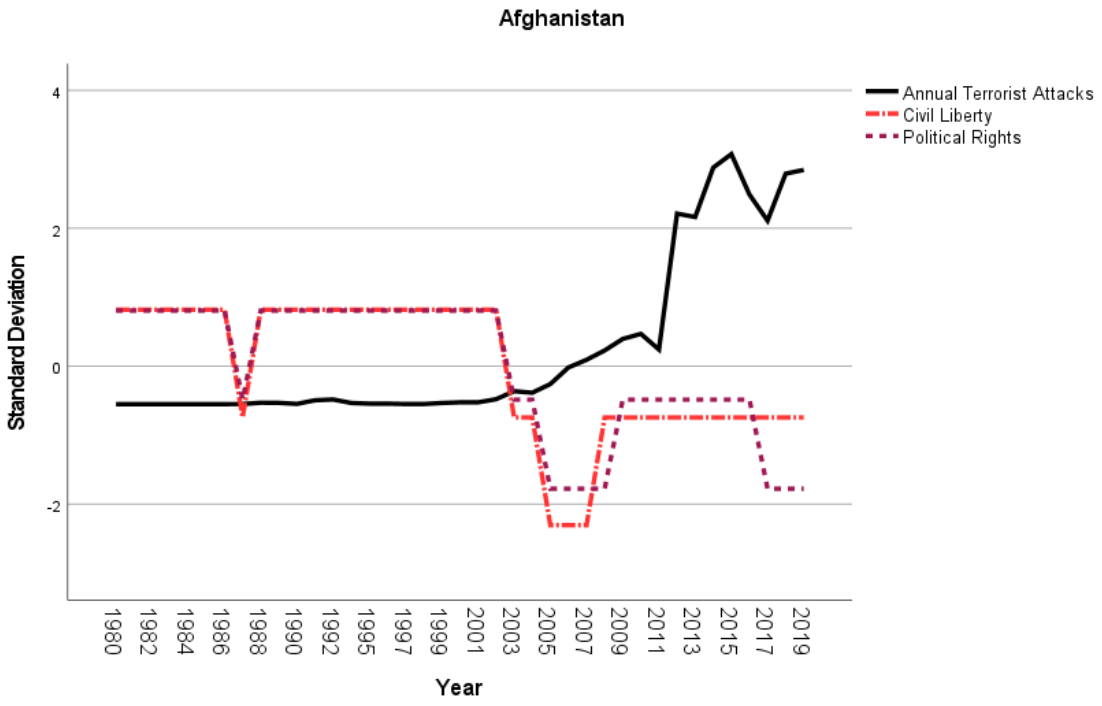

Figure 11: Standard Deviation changes in Annual Terrorist Attacks, Civil Liberties and Political Rights in Afghanistan from 1980-2019

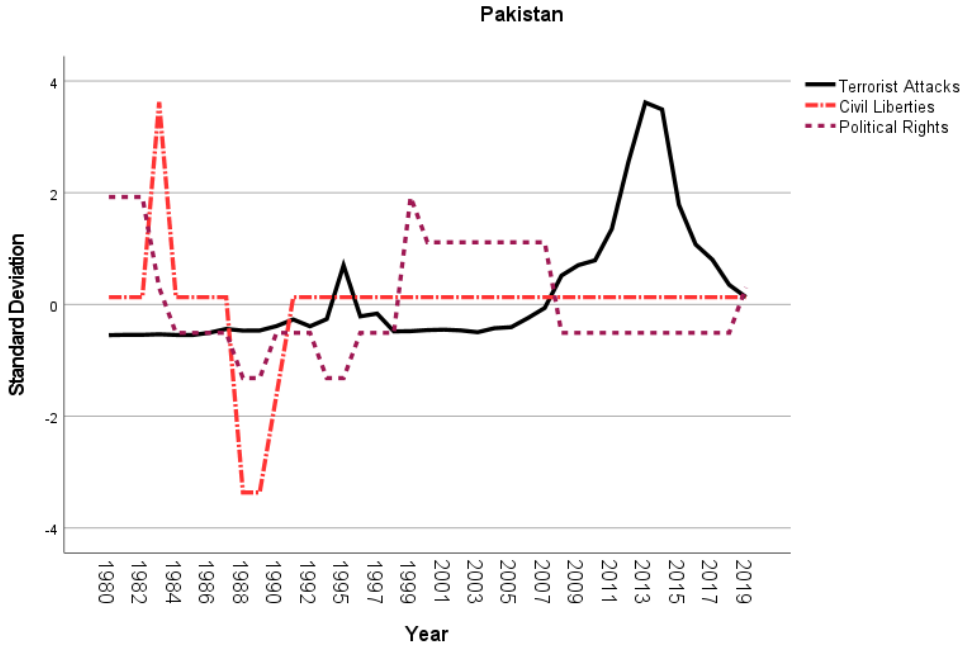

Figure 12: Standard Deviation changes in Annual Terrorist Attacks, Civil Liberties and Political Rights in Pakistan from 1980-2019

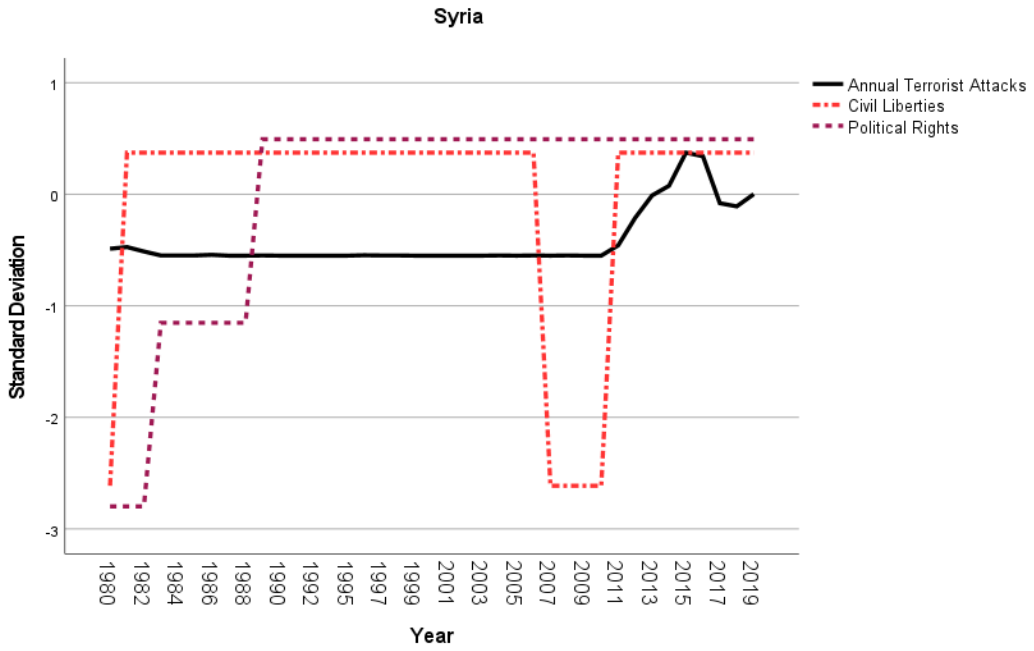

Figure 13: Standard Deviation changes in Annual Terrorist Attacks, Civil Liberties and Political Rights in Syria from 1980-2019

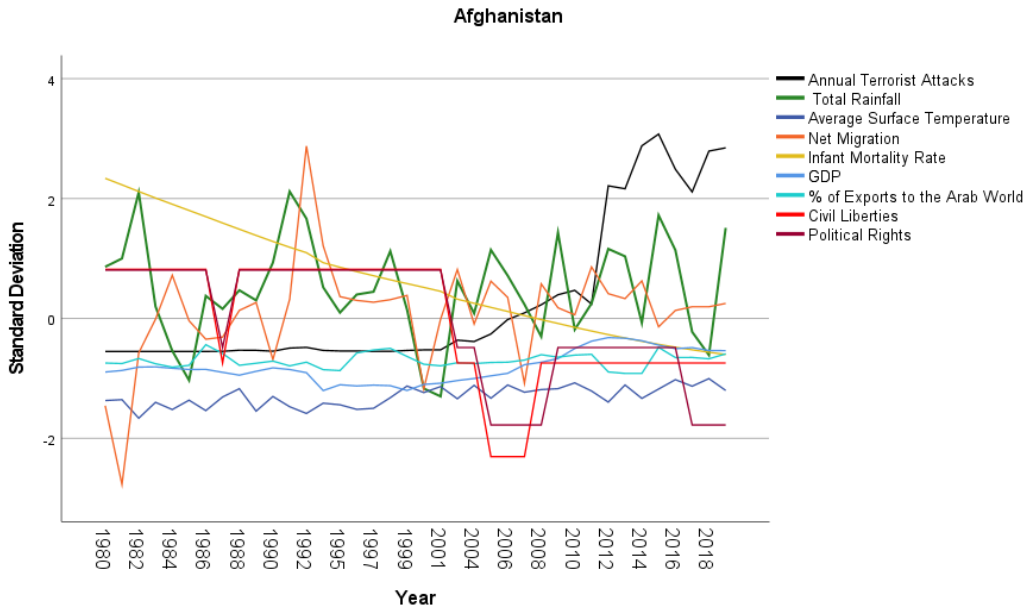

Figure 14: Standard Deviation changes in Annual Terrorist Attacks, Total Rainfall, Average Surface Temperatures, Net Migration, Infant Mortality Rate, GDP, Exports to the Arab World Civil Liberties and Political Rights in Afghanistan from 1980-2019.

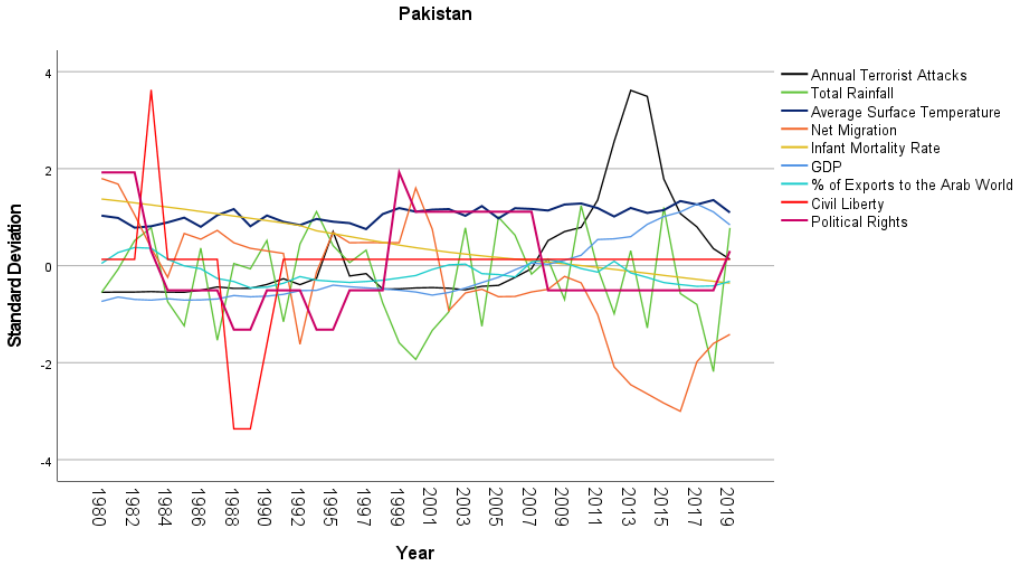

Figure 15: Standard Deviation changes in Annual Terrorist Attacks, Total Rainfall, Average Surface Temperatures, Net Migration, Infant Mortality Rate, GDP, Exports to the Arab World Civil Liberties and Political Rights in Pakistan from 1980-2019.

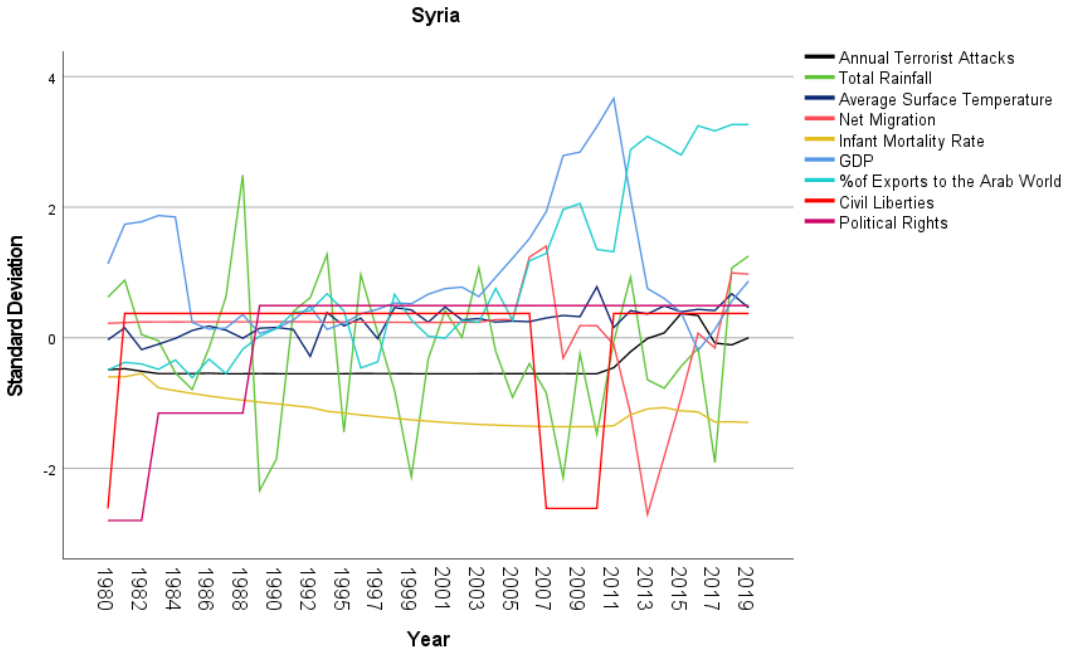

Figure 16: Standard Deviation changes in Annual Terrorist Attacks, Total Rainfall, Average Surface Temperatures, Net Migration, Infant Mortality Rate, GDP, Exports to the Arab World Civil Liberties and Political Rights in Afghanistan from 1980-2019

Chapter 5: Conclusion

5.1 Discussion

The focus of this study is to find a link between climate change and terrorist attacks, as it can redirect counterterrorism initiatives. While some might see climate changes as irrelevant to counter-terrorism attacks, when connected to other stressors, they may provide insight to the increase in terrorist attacks. The central research question of this mixed-methods study is to corroborate if there is a correlation between climate changes that lead to resource scarcity and terrorist attacks when taking into consideration other demographic, economic, and political stressors. The study focused on three states: Afghanistan, Pakistan, and Syria. These three cases were selected due to their environmental and political similarities. In addition, these states have endured a variety of crises related to both climate change and terrorism. The following section analyzes the multiple regression analysis from STATA based on the cross-sectional time-series data. In addition, this section also elaborates on trends presented in line charts created in SPSS. Elaboration and analysis are based on documented sociopolitical and environmental occurrences and are therefore inferential not explicit assumptions.

5.2 STATA Multiple Regression Analysis Discussion

Afghanistan was used as a reference country to the number of terrorist attacks experienced by Pakistan and Syria. This regression analysis proved to be statistically significant for the state of Syria as it comparably had a negative relationship with terrorist attacks in comparison to the state of Afghanistan. In addition, infant mortality rate, net migration, and political rights were statistically significant. Despite, the statistical significance both infant mortality rate and net migration, they had a negative relationship with the annual number of terrorist attacks—which is possibly a reflection of omitting a population variable. The negative

relationship between political rights and the annual number of terrorist attacks is difficult to assess. Despite the restrictions a state places on political rights, there is always the factor of free that can cause uprisings and terrorist attacks. Therefore, human nature (a predictor that would be difficult to measure) plays a significant role despite the statistically significant negative relationship. The observed climate variables that can lead to resource scarcity did not have a statistically significant relationship with terrorist attacks when looking at all three states combined and independently.

When analyzing the predictors in the state of Afghanistan independently, the statistically significant predictors were the infant mortality rate and gross domestic product. As mentioned previously, the negative relationship between infant mortality rate and terrorist attacks can be attributed to a population variable not being incorporated in the fixed effects model. The gross domestic product has a positive relationship with the annual number of terrorist attacks. These were unexpected results as it is often believed that a decrease in the gross domestic product can serve as a stressor and further increase the terrorist attacks in a state. However, the GDP itself may be increasing due to clandestine activities led by terrorist factions, such as the selling and distribution of opioids and arms. If there is an increase in GDP from such activities, there is more readily available funding for terrorist attacks.

Like Afghanistan, the state of Pakistan demonstrated that infant mortality was statistically significant and demonstrated a negative relationship with terrorist attacks. Another statistically significant predictor was that of the percentage of exports to the Arab World. This predictor had a positive relationship with terrorist attacks—such a result (much like the positive relationship seen between GDP and terrorist attacks in Afghanistan) is unexpected. However, certain exports within the state may be managed by terrorist factions to make a profit or to utilize

as a front and to transport other clandestine products. This can yield substantial funds that can be used to sustain terrorist activities—including that of terrorist attacks. Similar results appeared when analyzing the state of Syria independently, as the percentage of exports to the Arab World was statistically significant and had a positive relationship to that of annual terrorist attacks. Another predictor that was significant in the state of Syria was net migration, which demonstrated a negative relationship with annual terrorist attacks. As net migration increases, terrorist attacks may decrease as a terrorist group's main target may no longer be present in their region of operations.

5.3 SPSS Line Charts Discussion

Terrorist Attacks

When analyzing the line charts created it SPSS it is apparent that years that had peaks in terrorism align with significant events. For all three states, the standard deviations above the mean appeared after 2008. While it is possible that the well-documented Global War on Terror, could have placed a greater emphasis on reporting terrorist attacks. Notably as the desire for such information increases, so can the cases documented. However, the charts also demonstrated an increase in terrorist attacks when there were striking events within the state.

Afghanistan experienced an increase in attacks in 2012, likely due to President Hamid Karzai forcing American forces to leave Afghan villages and stay only within the military bases, after 16 villagers were killed by the United States military (News Desk, 2021). This created an ideal environment for religious extremist-based terrorism to thrive in villages, as tensions rose given the deaths of fellow Afghans. The years 2014 and 2017 showed an increase in terrorist attacks, likely related to NATO declaring their removal from the state and President Donald Trump emphasizing military involvement respectively (News Desk, 2021). Although the

presence of foreign forces likely increased tensions within the state; the departure of NATO removed layer of security, allowing for increased terrorist attacks.

In Pakistan, there was an increase in terrorist attacks in 2008 likely related to tribal related disputes in the state. This prompted protests, suicide bombings, and a notorious drone strike that killed Pakistani Taliban leader, Baitullah Mehsud. 2011 demonstrated another increase in Sunni extremist violence, possibly linked to the death of al-Qaeda leader Osama Bin Laden. The year 2014 reflected a historic peak in terrorist attacks (almost two standard deviations from the mean). This is likely a result of the Taliban targeting school children in the country (150 school children were kidnapped by the terrorist group this year alone) and the bombing of an international airport.

Similarly, in Syria terrorist attacks gained traction in 2011 in the wake of regime attacks on protests associated with the Arab Spring. 2014 saw another spike in terrorist attacks as the terrorist group Hezbollah began to gain traction in the state. The number of documented terrorist attacks further increased in 2015 and 2017—likely a consequence of Russian and American intervention, respectively. Concurrently, notable events embedded in this time frame include the Syrian army's arduous attempt to recapture the southern portion of the country.

Rainfall and Surface Temperatures

In terms of rainfall and temperature—there may be years that may have significantly different average temperatures and or rainfall, hence the range in standard deviations. However, there is still a cyclical nature to rainfall and temperature that is not properly demonstrated in the charts as the line graph shows changes in rather in a rather vague manner. Whereas such cyclical aspects of rainfall and surface temperature occur in rather explicit periods.

Take rainfall, for example, as it undeniably exists by means of the water cycle. Note that the event of rainfall itself is not instantaneous, and the event of rainfall can take longer to appear (drought) and essentially goes through the same process from start to finish (precipitation, condensation, precipitation). Each region has a unique curve that peaks at one time of year depending on the extent of the seasons experienced and drops once again. It could be possible that when observing one year at a time the relationship between droughts and terrorist attacks can become more defined.

Similarly, while surface temperature is not necessarily cyclical it is influenced by radiation. As the Earth rotates around the sun, light from the sun radiates in with higher intensities in specific regions. Thus, causing an increase in solar radiation, and consequently surface temperature. Therefore, there may be peaks simply caused by the positioning of the Earth and Sun and not necessarily global warming—causing a change in the standard deviation. The sun itself goes through a solar irradiance cycle. Solar irradiance is measured in watts per square meter (W/m2) and is defined as the amount of solar energy that reaches a given surface area per unit of time. There are peaks and troughs related to sunspots and solar flare indexes. Perhaps these events are reflected in line charts and are not necessarily due to global warming, although NASA implies that some climate-related studies imply solar irradiance impacting climate change (M. Kauffman, et al., n.d.). In addition, it is important to note that sand—which covers most of the regions observed in this study only reflects between 30-35 percent of solar radiation, increasing average surface temperatures all around (M. Kauffman et al., n.d.) This means that as desertification extrapolates through the region, less solar radiation will be reflected incrementing temperatures significantly.

Child Mortality

Except for Syria, which demonstrated a peak in child mortality in 2011 (likely from the civil war), all states had a decline in child mortality throughout the years of observation, even in years where terrorist attacks peaked. The line charts for Afghanistan showed that infant mortality rates from approximately 1980 to 2005 were two standard deviations from their mean. In contrast, Syria's infant mortality rate has remained rather constant with standard deviations below the mean.

It is possible that there is not an accurate reporting of child mortality rates. A lot of these deaths could have occurred in rural areas where there is a lack of medical institutions of any form. Child mortality rates are more likely to be reported properly in larger cities, and even those reports themselves may have lower child mortality rates given the available resources. For example, during the Soviet occupation in Afghanistan, resources immersed the urban cities such as Kabul, possibly decreasing child mortality in that region which is generally reported on more consistently. Moreover, it is important to note that child mortality rates in all three states can go unreported if there are deceased parents. Meaning that there is no one left to report the death of their child. In addition, the decrease in child mortality rate despite the ongoing conflicts can be attributed to changes in population growth itself. A state can experience a decrease in population growth due to socio-political factors, or that change in population can reflect inconsistencies in child registration. For example, children are often not registered right away, or they may pass before being registered.

Net Migration

In terms of the net migration presented in the line graphs, there seems to be a similar shape in Afghanistan when looking at rainfall and net migration. This could be because there is a

delay in migration after a drought. In contrast, both Pakistan and Syria show peaks of net migration, followed by a drastic drop. All three states have standard deviations that vary drastically. Afghanistan has a net migration range from three standard deviations above and below the mean. The state of Pakistan having net migrations range from two standard deviations above the mean and three standard deviations below. In contrast, Syria had a range of net migration approximately one standard deviation above the mean and three below. This is likely attributed to fewer people moving away if they are dead or cannot physically leave the country.

As in times of conflict, the price of living can increase significantly. In the case of Syria, while neighboring countries such as Greece and Turkey took in refugees, they quickly became overwhelmed and stopped. This causes a shift in net migrations of states, if there is relatively no one leaving or entering a particular country given that that neighboring countries can have similar conditions about sociopolitical tensions, violence, and a degraded physical environment.

Gross Domestic Product

All three states demonstrate an increase in GDP between 2011 and 2017, despite that period being embedded with significant socio-political events. Such events include the withdrawal of U.S troops from Afghanistan, the peak of the Syrian civil war, and the Arab Spring. Amid such political tensions, significant GDP growth seems unlikely—at least via the legal routes. Afghanistan had GDP standard deviations relatively close to its mean throughout the years observed in this study, while Pakistan consistently had a GDP approximately one standard deviation below its mean. In contrast, Syria's GDP varied 2-4 standard deviations above the mean. Note that while illicit activities such as exporting opioids (Afghanistan) or selling archeological artifacts (Syria), cannot be reported as exports; a portion of the clandestine money ends up circulating within the country, and is possibly reflected in the GDP. If there is resource

scarcity given crop failures due to climate change GDP may not reflect such resource scarcity that is being inflicted by climate change because of the movement of such clandestine money within the economy.

Percentage of Exports to the Arab World

In terms of the percentage of exports to the Arab world, Afghanistan and Pakistan demonstrated a steady line, with standard deviations slightly below the mean within the forty years observed, meaning that there was not a notable change in the percentage of exports. However, Syria had a significant increase in exports to the Arab World starting from 2003. The standard deviations went from being right at the mean in 2003, and gradually increasing to over three standard deviations above the mean by 2017. This is surprising given the pro-democratic Arab Spring movement and surplus of uprisings throughout the state that took place the year prior that would likely stunt the movement of exports in the region (Human Rights Watch, 2024). However, the former Director of the Central Bureau of Statistics and Professor of the Faculty, Shafiq Arbash, has stated that the Syrian government has prevented the publication of exports in the state since 2013 (Fansa, 2024). In 2023, Damascus claimed a 60% increase in exports, however, Arbash argues that such numbers do not match those circulating within the business sector (Fansa, 2024). It is possible that the omission or misreporting of exports since 2013 is to maintain the image that the regime has everything under control.

Civil Liberties and Political Rights

Both civil liberties and political rights reflected changes. Although the changes were rather long term, they were observed across all three states in this study. Civil liberties and political rights were rated on a scale from 1-7. A score of 1 means that the state has low freedom-related restrictions, while a score of 7 would signal high freedom-related restrictions.

Afghanistan's civil liberties and political rights seem to be tied together. Apart from 1987, civil liberties and political rights remained one standard deviation above the mean until 2002, likely due to the beginning of the global war on terror and the changes in regime within the state.

Pakistan had varying standard deviations in both variables within the same year. For example, in 1983 civil liberties were almost four standard deviations above the mean, while political rights were below the mean. Yet in 1989, the standard deviation of civil liberties dropped to approximately three units below the mean. Since the early 2000s, civil liberties have stayed right at the mean and have not changed, while political rights have gone up by two standard deviations and later declined.

This is likely that even with emerging democracies—as experienced in Afghanistan and Pakistan—the states continue to constrict human rights. While it is not guaranteed that a democracy-based state will equate to terrorist-free states, it is likely that with the presence of civil liberties and political rights, the likelihood of terrorist-sponsored terrorism may decrease. Syria had the least number of changes in both variables likely attributed to the Assad regime. Political rights have been approximately .5 standard deviations above the mean since 1990, as have civil liberties with the exception between the years 2007-2011 where civil liberties were 3 standard deviations below the mean—likely setting the stage for the Arab Spring.

5.4 Limitations and Future Studies

Given that these states are conflict prone and often lack the financial means to fund research; collection and publishing of such data is beyond difficult. If a future study is created in the same states (or within a particular region) to counter a limited sample size, it would be advantageous for experts already living in the states of interest to be directly funded to conduct a similar study. While scholars across the world may have substantial expertise regarding the

state—nothing will replace the experiences of someone who calls that country their home. The expert would likely use variables deemed to be significant indicators of resource scarcity, induced by climate change unique to that region. In addition, someone living in that country can have constant (possibly even daily) reports of things such as prices of produce.

A key limitation in this study was that there were particular years where a significant number of terrorist attacks had occurred within the states of interest, yet there was not data available, ultimately leaving gaps in the dataset and omitting information that could have helped fortify the study's intended purpose. Furthermore, this essentially influenced the period and variables chosen for the study. However, to further expand this study concepts discussed could also be applied to different states that are in similar predicaments (experiencing resource scarcity and terrorist attacks), such as other states in the Middle East or states in Northern Africa.

It is even possible for a study to encompass data from every country of the world as this would increase the sample size and statistical power as these were two key limitations in the study. The sample size (s=114) decreases the power of the study, increasing the likelihood of a Type II error. In addition, it allows for a sampling-related error, as the sample itself is not representative of the entire population of the data, as the study does not include all countries that experience climate change that leads to resource scarcity and terrorist attacks. While there may be regions that may not experience terrorist attacks with the same fervor as others, they nonetheless experience their version of climate change. It would be compelling to see the contrast in the relationship between climate change in terrorist attacks in regions that vary drastically in terms of both variables. The results of one study could potentially strengthen the results of others as there would be an indication that resource scarcity prompted by climate change contributes to the number of terrorist attacks in a region.

There can also be an expansion of data based on the time range as their data may be available for more extensive periods in comparison to the ones used for this study. In addition, there are a multitude of other demographic, economic, and political control variables that can be observed. This can include the number of individuals who are educated, the number of individuals who depend on aid (such as from the government, non-profits, or non-government organizations), the percentage of exports and imports, and the number of ethnic and religious conflicts, or a population variable. Note that in this study, omitting the population created a limitation. While GDP and child mortality rate can be used as measures of development, it would be necessary to include the variable of population. The omission of such a variable likely led to a negative relationship between child mortality and terror attacks. Future research should include a population-related variable, such as population growth rate or total population.

The environmental variables chosen for this study pose another limitation as climate change is experienced differently in every region. While the states observed in this have limited rainfall and experience arid climates, there may be other useful (essential climate variables) ECVs that signal climate change that can lead to resource scarcity. It is important for any future studies to properly identify the ECVs in a region that indicates climate change. Some countries may reflect the changes in their sea level, nutrient concentration, and soil moisture. Studying the way a country experiences climate change is essential to be able to study the relationship it has with terrorism.

The dependent variable of interest is that of terrorist attacks, and while the act of terrorism is systematic and calculated, there is still an element of unpredictability brought upon by human nature. Ultimately, is difficult to string together variables that serve as stressors for terrorist attacks, given that those stressor variables have their own set of stressors that influence

them. Take the percentage of exports for example. It is not just climate-related resource scarcity that causes changes in the percentage of exports but also the demand for products, tariffs, and export-related laws. A similar approach can be taken with terrorist attacks, as scholars may only be observing rather superficial causes for terrorist recruitment and attacks respectively.

5.5 Closing Remarks

This mixed-methods study intended to identify the correlation between climate changes that lead to resource scarcity such as rainfall and surface temperatures with terrorist attacks when taking into consideration other demographic, economic, and political stressors, in the states of Afghanistan, Pakistan, and Syria. The argument did not assert a direct connection between environmental changes that cause resource scarcity and terrorist attacks but rather hypothesized an indirect connection between the two phenomena. In combination, with other stressors that are deemed to have greater explanatory power to terrorist attacks, climate changes that lead to resource scarcity can be driving forces to terrorist attacks as they can shape the social, economic, and political grievances in a state. This is incredibly relevant to the international community and states that are swamped by terrorist attacks invest in counterterrorism initiatives to reduce the number and severity of such attacks. This study argued that climate change that causes resource scarcity is an underlying factor driving terrorism that must be addressed and possibly yield positive results.

The states observed in this study are still enduring the consequences of climate change and terrorist attacks alike. In 2023, leaders attending the United Nations Climate Change Conference (also known as COP28) urged the international community to stand in solidarity with Afghanistan, as the frequency and intensity of droughts have now made it the fourth most vulnerable country in the world. The state has experienced an onset of environmental changes

from the loss of glacial areas to natural disasters. The state has experienced a 14% decrease in the glacial area since 1990, consequently increasing temperatures and depleting a key water source (United Nations Office for the Coordination of Humanitarian Affairs, 2023.) In 2013 2.4 million Afghans did not have access to clean water—today that number is 21 million (United Nations Office for the Coordination of Humanitarian Affairs, 2023).

As discussed above, climate change and its consequences are not the only factors contributing to the Afghan fight for stability. Even if the state may not experience terrorism with the same intensity as a decade before, there are still remnants of the global war on terror that pose serious threats. As Afghanistan—a state so heavily dependent on agriculture— attempts to become resilient, it faces continued challenges. For example, obtaining a fruitful crop season has been proven difficult given that farmers must deal with soil that is heavily polluted by explosives (United Nations Office for the Coordination of Humanitarian Affairs, 2023.) Farmers are incredibly susceptible to setting off hidden land mines—as are young children who collect remnants of shells from explosives. Furthermore, those who decide to return to rural Afghanistan are at a high risk of becoming injured, as they are not familiar with the locations of deadly sites (United Nations Office for the Coordination of Humanitarian Affairs, 2023.).

Aid to Afghanistan is not enough. For the state to become resilient and most importantly self-sufficient there needs to be constant collaboration with other states and NGOs. Such external collaboration is essential given that professionals such as doctors, engineers, scientists, and journalists, had the financial means to leave Afghanistan when the Taliban took power in 2021 (Scollon, 2021). Since then, the Taliban has completely reshaped the inner functions of the state. In 2021, the Taliban forced 400 families (primarily agriculturally dependent families) out of their land. The families were not able to finish harvesting their crops for the season, nor were able to

take their belongings (Stockholm International Peace Institute, 2023). The Taliban then gave the confiscated land to their soldiers. These are prime examples that emphasize the current socio-political climate of Afghanistan. The Taliban's repressive policy does not allow for international collaboration and advancement given its continuous preference for only its soldiers and those o of the Shite denomination (Stockholm International Peace Institute, 2023).

Like Afghanistan, Pakistan is attempting to mitigate the impacts of climate change amid political instability. In terms of the impacts of climate change, the country is being pulled between historic floods and ongoing heat waves. Previously, Pakistan has not made climate change a priority given the myriad of crises (Bhutto, 2023). If any mitigation efforts were set forth by the state, they were focused on short-term solutions (Bhutto, 2023). If the state intends to become resilient and have efficient policies, it must be aware of all the factors that can hinder progress. For example, the 2022 floods prompted criticism from journalists—leading the government to punish the individuals (Human Rights Watch, 2023).

Repression of civil liberties such as free speech is likely not the most effective measure to create unity and progress. Journalists are not the only ones targeted by the Pakistani government. Non-government organizations have reported being harassed and intimated by government officials. While such instances may seem nuanced, it is pivotal that the state manages external aid properly, given the limited economic resources it currently has. A variety of United States-based entities have pledged aid to Pakistan, from the U.S Department of Agriculture to the U.S National Park Service (U.S Mission Pakistan, 2023).

Once such entities implement programs the state must ensure that it is not only large urban cities that are being educated and receiving resources—as that widens the inequality gap. Aside from pre-existing economic vulnerabilities of rural regions in the country, Pakistani

leaders must continue to resolve the Pakistani-based Taliban faction Pakistani Taliban: Tehrik-i-Taliban. This terrorist group thrives in chaos often targeting Pakistani law enforcement and vulnerable minority groups.

Syria is no exception in enduring environmental hardships and natural disasters. In 2023 a magnitude 7.8 earthquake struck the border between Turkey and Syria (Center for Disaster Philanthropy, 2024). This was especially detrimental to the country, given it is already in a state of emergency. The Center for Disaster Philanthropy estimates that the earthquake itself has left 1 in three children homeless (Center for Disaster Philanthropy, 2024). Despite clean-up efforts—a year later the region affected by the earthquake remains in a state of rubble. While a natural disaster such as the 2023 earthquake is not induced by climate change, its occurrence further exacerbated the effects of an ongoing drought.

Droughts undoubtedly cause resource scarcity, from water to food. The occurrence of the earthquake combined with the ongoing crisis (that is predicted to only get worse)—further increased grain prices (Zawahri, 2024). It is estimated that 90% of the Syrian population now lives in a state of poverty (Zawahri, 2024). While the environment has played a crucial role in the degradation of the country—as has conflict itself. Resource scarcity has been used by entities to further their agenda. Instead of implementing resources to help Syrians reach resilience, resources have been allocated to perpetuate further destruction. For example, irrigation systems and wastewater facilities have been damaged/destroyed as they have been common targets by the state of Russia the Syrian government, and the Islamic State group (Zawahri, 2024). This has led many Syrians to use any water that is available to them, regardless of its quality. Because of these cases of cholera and Hepatitis A have escalated. This is incredibly alarming given that only 59% of the country's hospitals can fully operate (Zawahri, 2024). The combination of such crises

may push civilians toward supporting terrorist groups. Although they often cause and even aggregate such crises, they often are the only ones that can provide a form of relief to citizens.

Climate change, resource scarcity, and terrorism are crises that will define the rest of the 21st century. The way humanity navigates through them is pivotal if we wish to be resilient. While these crises are more evident in some parts of the world than others, states that have the knowledge, resources, and funding to guide states that are directly facing such crises should be motivated to do so as crises do not discriminate and can easily spread. We only have one planet in this lifetime and because we all co-exist now more than ever via globalization. Problems somewhere can become a problem everywhere. When we see an image of a mother carrying a child amidst the floods of Pakistan, a farmer walking on the barren cracked ground in Syria, and a young boy filling up an oil canister with murky water in Afghanistan, we must not view them as isolated events. Rather we should reflect on the vulnerabilities that they face beyond those depicted in the image, including their susceptibility to hunger, disease, and being targeted by terrorist groups.

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Vita

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