Generating Opportunity in a Climate Changed Environment

A Monograph

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Climate change is altering the physical environment that people rely on for everyday life. When environmental change threatens the survival of large groups of people, governments must respond to prevent conflict and maintain stability. How does this threat translate into opportunities for adversaries to gain influence and weaken US power? The Syrian Civil War offers a sobering case study translating climate change induced drought into internal conflict, and ultimately into an arena of great power competition. Complexity is the key to linking the Syrian causal chain of climate-people-conflict-strategic competition, and provides insights to future threats. Unexpected environmental changes destabilize societies in fragile states, opening the door to outside intervention. If adversaries such as Russia or China take the open door the United States stands to lose influence. Climate change is a real, multi-faceted threat that cannot simply be stopped in the near-term. Syria is just one glaring example of the threat, as numerous scenarios are manifesting now, and dozens more will appear unexpectedly. Planning for climate change scenarios is essential to maintaining US strategic advantage in the competitive world. The primary method to achieving this is partnering with all at-risk nations, while also focusing military planners on likely climate scenarios.

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Abstract

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Climate change is altering the physical environment that people rely on for everyday life. When environmental change threatens the survival of large groups of people, governments must respond to prevent conflict and maintain stability. How does this threat translate into opportunities for adversaries to gain influence and weaken US power? The Syrian Civil War offers a sobering case study translating climate change induced drought into internal conflict, and ultimately into an arena of great power competition. Complexity is the key to linking the Syrian causal chain of climate-people-conflict-strategic competition, and provides insights to future threats. Unexpected environmental changes destabilize societies in fragile states, opening the door to outside intervention. If adversaries such as Russia or China take the open door the United States stands to lose influence. Climate change is a real, multi-faceted threat that cannot simply be stopped in the near-term. Syria is just one glaring example of the threat, as numerous scenarios are manifesting now, and dozens more will appear unexpectedly. Planning for climate change scenarios is essential to maintaining US strategic advantage in the competitive world. The primary method to achieving this is partnering with all at-risk nations, while also focusing military planners on likely climate scenarios.

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Abbreviations

DoD	Department of Defense
IPCC	International Panel on Climate Change
ISIL	Islamic State of Iraq and the Levant
MENA	Middle East and North Africa
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
TRADOC	US Army Training and Doctrine Command

Introduction

Between summer 2006 and winter 2011, a prolonged drought struck the farmlands of Syria, indicating an unexpected and unprecedented change in the physical environment without parallel in the region's history. By 2019 Russia has seized the opportunity created by the Syrian drought, gaining vastly expanded bases in Syria, deploying high-end weapons, and exerting considerable influence over Bashar Al-Assad's government. While seemingly unrelated events, a direct link exists from the impacts of the drought to both the Syrian Civil War and Russia's expanded regional presence.[1] The popular narrative of the Syrian Civil War focuses on sectarian religious conflict and a broader international fight against violent extremist organizations. The alternate narrative described here instead addresses the complexity of both the roots and triggers of the Syrian conflict, demonstrating how a drought caused by climate change is a key factor in the United States losing influence and freedom of action in the Middle East.

The main question in the Syrian example remains how Russian influence expanded due to a drought localized in one Middle Eastern nation. The simple answer lies in the unwillingness of the Syrian government to react to a major change in the environment, allowing crop failures to threaten the survival of Syrian farmers. This ultimately de-stabilized the population and generated a full-scale civil war which provided Russia an opportunity to intercede on behalf of the Syrian government. Widening the scope beyond Syria to a larger global and strategic environment, it is clear the United States must take the potential impacts of climate change seriously, as environmental changes will continue to create opportunities for adversaries to gain influence and erode US standing in the world.

Identifying where climate triggered events are likely to erode US influence requires describing three main linkages. The first step is to understand the types of environmental changes

[1] Peter H. Gleick, "Water, Drought, Climate Change, and Conflict in Syria," *Weather, Climate, And Society* 6, no. 3 (2014): 332.

resulting from climate change and how to anticipate them. Second is recognizing the connections between environmental changes and human adaptations, and the societal unrest that results when those are insufficient to maintain the status quo. The final link ties great power competition into local and regional unrest, understanding how adversaries exploit these opportunities to expand influence. The threat posed by climate change exists primarily in less developed regions of the world where day to day life relies directly on the environment, and people possess little flexibility to adapt beyond familiar seasonal variations. Governments in these regions commonly have limited financial and material resources available to manage major changes in the environment while also maintaining the security of their population and territory. Political constraints are also common, frequently manifesting as unwillingness to divert resources to the people suffering losses from environmental change.

Domestic instability in populations vulnerable to environmental change creates potential opportunities for foreign intervention to gain influence or secure access. Intervention options range from humanitarian assistance and economic investment to military equipping and sometimes direct combat support. When the intervening actor is an adversary, power and access gained is to the detriment of US interests. This occurred in Syria, when in return for intelligence, military equipment, and direct military support, Syria granted Russia a significantly expanded footprint and greatly increased regional influence. Anticipating the impacts of climate change and proactively mitigating them, or building cooperative relationships prior to crisis preserves US security and denies adversaries inroads to gain control.

The terms climate change and environmental change are similar but have important distinctions. Climate change refers to a source generating change in the physical environment while environmental change refers to the actual physical changes. There is no commonly accepted definition of environmental change despite its frequent use in physical environment literature and human interactions with it. The term environment in its most basic form means “the

circumstances, objects, or conditions by which one is surrounded."[2] This analysis focuses on the natural physical environment, rather than other common uses of the term referring to security, political, or social settings. Literature on physical environmental change uses a variety of terms in place of 'change.' Degradation, damage, modification, and other terms commonly placed after 'environmental' vary depending on the mechanism causing the change or the perceived value of the change.[3] Such terms may be useful for specific application; however, they are not necessary for the broad analysis conducted here. Therefore, environmental change is defined for the purposes of this monograph as a change or disturbance of the natural environment beyond normally variable conditions.

By applying the above definition for environmental change, it becomes clear that US strategy since the 1990s has approached the topic in varying ways. Climate change hazards to US national security are first stated in strategic documents in 1993, when the George H. W. Bush administration stated, "Climate change and… depletion of water supplies have far-reaching effects on the capacity of countries to sustain economic growth and ensure a healthy environment for their citizens."[4] Climate change gained interest through the 1990s with entire sections dedicated to potential threats, impacts and mitigation approaches. These appeared in almost every major policy document until 2016 when policy shifted, prioritizing economic activities over climate mitigation. Most early policy focused on economic and humanitarian approaches to mitigating the effects of climate change on human interaction with the environment, with little direction to the military.[5] In 2010 the Department of Defense (DoD) became directly involved

[2] *Webster's Dictionary Online*, "Environment," accessed October 25, 2019, https://www.merriam-webster.com/dictionary/environment.

[3] D. L. Johnson et al., "Meanings of Environmental Terms," *Journal of Environmental Quality* 26, no. 3 (1997): 583; "Global Environmental Change," World Health Organization, accessed October 25, 2019, https://www.who.int/globalchange/environment/en/.

[4] The White House, *National Security Strategy of The United States of America* (Washington, DC: Government Printing Office, 1993), 11-12.

[5] The White House, *National Security Strategy* (1993), 11-12; The White House, *A National Security Strategy of Engagement and Enlargement* (Washington, DC: Government Printing Office, 1994),

with security implications of environmental change caused by a shifting climate. The *2010 Quadrennial Defense Review* identified two broad ways the climate would impact the DoD, through impacts on defense infrastructure and geopolitical repercussions from global physical effects. Specific forms of environmental changes cited include sea level rise, extreme weather, rising temperatures, longer growing seasons, alterations to rivers, and increased precipitation.[6] The link between the impacts and security concentrates on weak and fragile states that have minimal capacity to adapt to change, and are therefore challenged in protecting their population.

With the DoD's interest in climate change established, what is next required is describing how environmental alterations translate into strategic competition. Three sections of analysis tie global political repercussions to climate shifts in comparatively small areas of geography and population. The first section describes the major forms of environmental change, and the scientific basis for climate change. The impacts of a changing environment on human activity explains how the climate has direct social and political effects, and offers insight into potential future scenarios. The anthropogenic roots of climate change demonstrate this phenomenon is of pressing concern by rapidly presenting unanticipated threats worldwide.[7]

15; The White House, *A National Security Strategy for a New Century* (Washington, DC: Government Printing Office, 1997), 22; The White House, *A National Security Strategy for a New Century* (Washington, DC: Government Printing Office, 1999), 2, 13-14; The White House, *National Security Strategy of The United States of America* (Washington, DC: Government Printing Office, 2002), 20; The White House, *2010 National Security Strategy* (Washington, DC: Government Printing Office, 2010), 23, 47; The White House, *2015 National Security Strategy* (Washington, DC: Government Printing Office, 2015), 2, 12; The White House, *National Security Strategy of The United States of America* (Washington, DC: Government Printing Office, 2017), 22.

[6] US Department of Defense, *2010 Quadrennial Defense Review Report* (Washington, DC: Government Printing Office, February 2010), 84.

[7] International Panel on Climate Change (IPCC), "2013: Summary for Policymakers," in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* ed. T. F. Stocker et al. (Cambridge: Cambridge University Press, 2013), 17-19; National Research Council, *Surface Temperature Reconstructions for the Last 2,000 Years* (Washington, DC: National Academy Press, 2006). 2-3. Global air surface temperatures have increased by 1° Celsius since 1850, an unprecedented rapid change compared to temperature changes over the last 2000 years.

The second section analyzes the recent conflict in Syria, sequentially tracing a historic drought to the current state of expanded Russian influence. The case study begins by analyzing Syrian farmers struck by severe drought in 2006 through the beginning of the conflict in 2011. Next is the Syrian social and political situation under Assad's regime, a stable autocracy with underlying social, political, and religious tensions. The impacts of the drought on predominantly Sunni Muslim farmers holding second class status in the Shia dominated government highlights the dangers of inaction and solidifies the link from drought to protests in early 2011.

With the start of the conflict established, the study's third section transitions to the broader context of Syria, the Middle East, and Russia's expanding influence. Arab Spring protests throughout the region combined with US-led military operations in Iraq contributed to Syria's tenuous stability. Combining with long-standing internal discord, external pressures presented a reasonable threat to the Syrian regime, explaining the violent response to protests and the resulting civil war. Once Russia entered the conflict, its influence expanded from weapons shipments and advisors for Assad's military into air, sea, and ground forces engaging in direct combat. This section concludes with the current state of Russian military capabilities in Syria, demonstrating the significant and enduring advantages that now exist for Russia in the Eastern Mediterranean and broader Middle East and North Africa (MENA) region.

In closing the monograph discusses methods to prevent adversaries from exploiting environmentally triggered windows of opportunities. Potential options to mitigate future occurrences draw from several scenarios of unprecedented environmental change likely in the near-term. Options include addressing the causes or impacts of environmental change, completing the analysis with a conceptual path to prevent the continued decay of American influence abroad.

Complexity

The topics considered here are vastly complex, which makes identifying and describing the linkages challenging. The climate, human social structures, and international politics are each

incredibly complex systems; however, the complexity does not stop there as these systems are all interconnected. A change in one reverberates through them all. Linking climate change to great power competition and intervention in Syria requires tracing the connections among the systems. Complexity theory and a systems approach provides the essential lens to tie together the seemingly disparate systems. Much like a camera lens, complexity theory allows a wide angle to observe the broad system and its major connections as well as the ability to zoom in and identify the intricate details within the system.

Complexity theory focuses on the actions and interactions of systems and is particularly useful in describing complex adaptive systems. Defined by Army Tactics Publication 5-01, *Army Design Methodology*, systems are "a group of interacting, interrelated, and interdependent components or subsystems that form a complex and unified whole."[8] Every system has an internal structure arranging the components and interactions that define the system and achieve its purpose. Systems complexity arises in several ways, most apparently with numerous components within a system, and with a high degree of interconnections among those components. Less obvious is complexity that arises from system structures that are not clearly observable, leaving the system borders unclear and making the system functions difficult to understand.[9] Since the ability to describe a system is central to the ability to understand it, complex systems with many components and unclear structures present cognitive challenges.[10]

Complex adaptive systems combine the elements of complexity and add further dynamics to the equation. The word adaptive indicates the self-regulating nature of systems managing changes in the environment. These systems do this by modifying the components and connections

[8] US Department of the Army, Army Tactics Publication (ATP) 5-01, *Army Design Methodology* (Washington, DC: Government Printing Office, July 2015), 1-8.

[9] US Army, ATP 5-01, 1-8, 1-36.

[10] Yaneer Bar-Yam, *Making Things Work: Solving Complex Problems in a Complex World* (Cambridge, MA: Knowledge Press, 2004), 51.

to account for new conditions. Complex adaptive systems have varying mechanisms interacting in numerous ways. As inputs to the system change, old connections disappear and new ones appear. As variations occur, further transformation manifests as the elements continue to interact within the system.[11] Emergent behavior is common in complex adaptive systems where a small alteration to one component has exponential impacts on the system, and vice versa when major input deviations have little overall effect. Another common trait is compensating feedback where fluctuations are tempered by the system's reactions, resulting in deliberate attempts to modify a system having little actual effect.[12] Delayed feedback is another frequent trait of complex systems since it takes time for modifications to work through the system and generate effects.[13] Most important is not confusing complexity with chaos. Complex adaptive systems do not act randomly; they all have patterns even if they are not easily discernable.[14] Systems are not individual, detached, self-contained entities; rather, they are constantly interacting with other systems in the environment.

Interconnectedness refers to the connections between major systems, both with internally contained subsystems and interactions with other systems within the environment. Understanding this concept is similar to enabling the zoom function on a camera to focus closely on subsystems and detailed events. Conversely, applying the wide-angle lens reveals the larger system structure, encompassing relationships among systems in a broader section of the environment. A variety of lenses provides the ability to understand seemingly disparate events and apply logical insight to hypothesize relationships. Human industrial activity impacting the climate, which hurts farmers

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[11] Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (New York: Basic Books, 2000), 7-9.

[12] Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Currency Books, 2006), 58.

[13] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*, 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 48.

[14] Axelrod, *Harnessing Complexity*, 15, 62-63.

and foments rebellion in Syria, is one such chain. Zooming in on the connections between the distinct systems offers evidence that the individual relationships exist, while zooming out to the broad context connects the links forming the chain. The systems and relationships examined demonstrate the uniqueness of the climate change phenomenon occurring today, and establish the Syrian drought as a direct descendant. They further highlight how the drought devastated Syrian agriculture (and how that led to direct conflict with the Assad regime) and how Russia seized the opportunity to gain a strategic advantage in the region.

A Climate Changing World

Analyzing the effects of environmental change and anticipating where concern is greatest requires understanding the forces at work. Impacts on human populations, government responses, and the current strategic environment are necessary to provide the background to analyze specific instances of environmental change. The natural environment is an exceptionally large and diverse system with changes occurring in innumerable form. Applying the lens of complexity helps identify important links. The most important findings are common local environmental alterations anticipated with global climate change. These include shifting precipitation patterns causing droughts and floods, changing monsoons, fluctuating growing seasons, temperature variations, changing biodiversity, increasingly frequent and intense extreme weather, and sea level rise.[15]

Earth's climate is a truly complex adaptive system that is always in a state of transformation. This is undisputed in both the scientific community and through the highly charged political space surrounding climate change where debate focuses on whether current variations are normal features or human generated anomalies.[16] The rate of change is most concerning today. While slow and steady variations in climate patterns present problems,

[15] IPCC, "2013: Summary for Policymakers," 4-10.

[16] Naomi Oreskes, "The Scientific Consensus on Climate Change," *Science* 306, no. 5702 (2004): 1686-1687; IPCC, "2013: Summary for Policymakers," 661.

adaptation is feasible when stretched over the long-term. Sudden, unexpected climate shifts produce shocks to the system, presenting humans with significant challenges in short-term adaptation.[17]

The climate has been changing inconsistently since the early 1900s versus the previous 1,000 years. This dramatic change is known as the "Hockey Stick," owing to the data visualization tracking multiple data points to show steady and slight variations in surface temperatures for about 900 years forming a generally straight line, or the shaft of the hockey stick. That straight line takes a sharp turn upward at the start of the nineteenth century, maintaining a rapid ascent through today, or the hockey stick blade.[18] This is a distinct change in historic patterns, with the upward trend well exceeding any previous temperature variations by the 1950s and continuing to rise. Surface temperatures are easily understood and form the basis of most climate conversations but are not the only metric of change. Numerous measurements show a warming planet, rising ocean heat content, shrinking glaciers, receding polar ice, and sea level rise to name a few. These trends show rapidly heating; however, it is important to note that this does not translate into higher temperatures everywhere. Increasing global average temperatures is just one feature, hence the shift from what was first coined "global warming" to the now accepted phrase "climate change" which accounts for varied effects worldwide.[19]

When confronted with unexpected phenomena, the natural question raised is why this is happening now. Considering a complex adaptive system as a starting point, the first step is

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[17] Nick Mabey, *Delivering Climate Security: International Security Responses to a Climate Changed World* (Abingdon, UK: Routledge, 2008), 34-37.

[18] Petter G. Nils, "Armed Conflict and the Environment: A Critique of the Literature," *Journal of Peace Research* 35, no. 3, Special Issue on Environmental Conflict (1998): 1-3; Michael E. Mann, Raymond Bradley, and Malcolm Hughes, "Global-Scale Temperature Patterns and Climate Forcing Over the Past Six Centuries," *Nature* 392 (1998): 783.

[19] National Aeronautics and Space Administration (NASA), "The Effects of Climate Change: Climate by Any Other Name," accessed November 20, 2019, https://climate.nasa.gov/effects/; National Oceanic Atmospheric Administration (NOAA), "Climate Change & Global Warming," accessed November 20, 2019, https://www.climate.gov/news-features/category/96/all.

looking for changes to the system inputs. The only known shifts in climate inputs prior to the 1900s uptick in temperatures occurs as a byproduct of the industrial revolution. Greenhouse gas emissions generated by large-scale burning of fossil fuels exploded in the mid-1800s, continuing unabated through present day. Greenhouse gases increase temperatures through the greenhouse effect by blocking energy radiating out from earth's atmosphere, retaining heat and raising temperatures.[20] The complication for causality is the delay in rising temperatures, occurring decades after the industrial revolution began polluting on a massive scale. Delayed effects are common in complex adaptive systems because they initially compensate for changes and it takes time for new energy to resonate through the system to produce consistent feedback.[21] In this case earth's adaptive climate system absorbed decades of greenhouse gases before the equilibrium shifted.

Climate and People

The impact environmental change has on people's lives is the "so what" that moves climate change from the arena of scientific curiosity to everyday life and policy. Complex adaptive systems are emergent in nature and preclude forecasting all climate change effects on humans, removing the possibility of generating a comprehensive list of threats. What follows is a survey of the most likely and damaging impacts climate change will have on human activity. The list includes obscure concerns such as insect diversity and rainfall patterns, alongside well-known hazards of sea level rise, extreme weather, and temperature variations.

Sea level rise holds status as the most commonly conceptualized impact of climate change. This is due to recent images of tsunamis and hurricanes flooding large coastal areas, and in part thanks to dramatic Hollywood imagery of massive storms destroying New York City with

[20] NASA, "The Effects of Climate Change"; IPCC, "2013: Summary for Policymakers," 11-12.

[21] Gharajedaghi, *Systems Thinking*, 48-53.

disconcerting frequency.[22] Reality is somewhat different, with average sea levels rising slowly and anticipated to increase one to four feet by the year 2100. While four feet might not seem substantial, low elevation coastal areas account for ten percent of the world's population, almost 700 million people, and contain two-thirds of cities with over 5 million inhabitants.[23] Infrastructure is particularly vulnerable to sea level rise, and coastal areas contain a disproportionate amount of critical infrastructure, including ports and transportation terminals, water treatment plants, power plants, and refineries.[24] DoD and Presidential policy has long given attention to sea level rise, appearing regularly since the early 1990s.[25] Concern is both for damage to defense infrastructure in coastal areas, and more significantly the socio-economic impact it will have in stability challenged regions globally.

The effects of direct flooding are easy to visualize, however, sea level rise features effects extending beyond simple high-water levels. Sea level measurements are averaged heights including tidal variations, which means actual water levels peak beyond the estimated increase and spread over broader areas. Saltwater is toxic to almost all ecosystems and farmlands, poisoning native plants and ruining crops. Soil just occasionally inundated by saltwater is useless for cultivation since the residual contamination lasts long after the water recedes.[26] Another

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[22] *Geostorm*, directed by Dean Devlin (Warner Bros. Pictures, 2017); *The Day After Tomorrow*, directed by Roland Emmerich (20th Century Fox, 2004).

[23] Gordon McGranahan, Deborah Balk, and Bridget Anderson, "The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones," *Environment and Urbanization* 19, no. 1 (April 2007): 33. Low elevation coastal areas defined by below 30 feet above average sea level, notably not accounting for normal tidal variations where high tide matters most for impact to human activity.

[24] NOAA, "Climate Change & Global Warming"; McGranahan, Balk, and Anderson, "The Rising Tide," 33; US Department of Defense (DoD), Office of the Under Secretary of Defense for Acquisition and Sustainment, *Report on a Changing Climate to the Department of Defense* (Washington, DC, January 2019), 5-6.

[25] US DoD, *Quadrennial Defense Review* (2010), 84; The White House, *National Security Strategy* (1997), 22.

[26] NOAA, "Climate Change & Global Warming"; Jaouher Kerrou, Philippe Renard, and Jamila Tarhouni, "Status of The Korba Groundwater Resources (Tunisia): Observations and Three-Dimensional Modelling of Seawater Intrusion," *Hydrogeology Journal* 18 (2010): 1177.

potential problem is saltwater intrusion into freshwater aquifers, expanding contamination through underground freshwater reservoirs that often extend far inland. Arid coastal areas that rely on groundwater for consumption and agriculture are most susceptible to this threat. Vulnerable areas currently encompass much of the Mediterranean and North Africa, with some areas of Tunisia already experiencing saltwater contamination up to ten miles inland.[27] This threat was highlighted in the 1994 *National Security Strategy*, connected with alarm for regional stability when essential resources are at risk.[28] Other reasons for saltwater contamination as a consequence of climate change include extreme weather. Stronger storms increase the sea level as tropical storm winds generate storm surges capable of travelling further inland and onto higher ground into areas once deemed safe.

Extreme weather also comes in other forms, including hurricanes and typhoons, severe thunderstorms and tornadoes, winter storms with heavier rain and snow fall, higher winds, and dust storms. Each present unique challenges while amplifying other factors of climate change. Coastal erosion accelerates and often occurs in sudden bursts when strong storms wash away soil, buildings, and infrastructure.[29] Increasing severity, frequency, and duration of heatwaves and cold snaps stress energy infrastructure, cooling and heating systems, transportation networks, and directly menace human life. Early and late frosts damage crops, often at critical flowering stages that are impossible to recover from. High temperatures exacerbate wildfires, increasing susceptible areas and the intensity of fires while simultaneously limiting firefighter's endurance.[30]

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[27] Leila Radhouane, "Climate Change Impacts on North African Countries and on Some Tunisian Economic Sectors," *Journal of Agriculture and Environment for International Development* 107, no. 1 (2013): 105-108.

[28] The White House, *National Security Strategy* (1994), 15.

[29] NASA, "The Effects of Climate Change"; US Army War College, *Implications of Climate Change for the U.S. Army* (Carlisle Barracks, PA, July 2019), 8-9.

[30] David W. Inouye, "The Ecological and Evolutionary Significance of Frost in the Context of Climate Change," *Ecology Letters* 3 (2000): 459; NASA, "The Effects of Climate Change."

Land surface temperatures are the next area of concern with substantial implications for local ecosystems. Most plant and animal life are temperature dependent and varies markedly with even slight differences. Naturally occurring vegetation and animal ranges shift with long-term temperature changes as native species die off and are replaced by others adapted to the new conditions. This manifests in natural environments with landcover changes such as forests transitioning to grasslands or deserts and vice versa. Different ecosystems and altering plant life threaten agricultural and pastoral societies that must adapt or move to new areas.[31] These societies are likely to conflict with other land users or cross political boundaries invisible to a changing climate. The reaction of rural populations to environmental changes is one of the DoD's original concerns with climate change, citing from the earliest policies that impacts on farmers in the developing world will pressure weak governments and are likely to create conflict.[32]

Additionally, biodiversity concerns for rural areas continue as temperature sensitive insects integral to the ecosystem shift their range. Crop damaging pests often live longer in warmer temperatures, increasing exposure to crops and allowing additional reproduction cycles that produce exponentially higher populations. Also affected are insects considered environmentally beneficial like pollinators and predator insects that control pests. These often generate negative environmental effects as their numbers decrease and the ecosystem loses a critical link.[33] Current biodiversity is categorized in geographic bands containing similar plant, animal, and insect life that are determined by temperature, precipitation, and geography. These

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[31] International Panel on Climate Change, "2019: Summary for Policymakers Draft," in *Climate Change and Land: IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, ed. P. R. Shukla et al. (Cambridge: Cambridge University Press, 2019), 2-17; Frederick C. Cuny and Richard Hill, *Famine, Conflict, and Response: A Basic Guide* (Hartford, CT: Kumarian Press, 1999), 34-37; US Environmental Protection Agency (EPA), "Climate Change Indicators: Length of Growing Season," accessed November 27, 2019, https://www.epa.gov/climate-indicators/climate-change-indicators-length-growing-season.

[32] The White House, *National Security Strategy* (1994), 15, 26.

[33] IPCC, "2019: Summary for Policymakers," 1-16, 1-17.

bands shift as their determinants change, creating potential scenarios of arable land today being unsuitable for cultivation in a few decades. Biodiversity changes are a product of the planetary climate system and do not conform to political boundaries, complicating the ability of people to simply follow migrating resources. The most concerning impacts are anticipated swings of ideal wheat and grain producing conditions moving further north in the northern hemisphere, and further south in the southern hemisphere.[34] This pushes more resources to the most modern and developed nations, and away from the least developed and resource constrained regions concentrated close to the equator.

Rainfall pattern changes contribute to biodiversity shifts and present other threats to human systems. People rely on freshwater for daily life beyond just for drinking. Water is necessary for agriculture, cooking, sanitation, industry, and unlike many substances is not substitutable. Technology and conservation efforts reduce consumption, but are often expensive and suitable only in developed nations. Differences in water resources will occur in numerous ways, from simple increases and decreases in precipitation, to fundamental changes in time of year and intensity of rainfall. While some areas will see rainfall decreases and fall into long droughts, other areas will see increases or suffer frequent and severe flooding inundating historically dry areas.[35]

The first thing that usually comes to mind with rain or snowfall is concern over declining amounts, but increased precipitation also presents serious challenges, and not just from flooding. Water is the principal force shaping land, over time carving out valleys and canyons, creating flood plains, and depositing sediment that creates fertile farmland. These components of natural river systems manage water within the system, and adapt as the amount of inflows changes. People modify natural systems with manmade infrastructure to prevent flooding, redistribute

[34] IPCC, "2019: Summary for Policymakers," 17-1, 2-17; Mabey, *Climate Security*, 19, 29.

[35] IPCC, "2013: Summary for Policymakers," 20-23; NOAA, "Climate Change & Global Warming"; US DoD, *Quadrennial Defense Review* (2010), 84.

water for irrigation and consumption, protect farmland, and provide navigable waterways.[36] These water management schemes are designed based on historic amounts of precipitation entering the system. More precipitation challenges the natural systems, and human modifications prevent natural adaptation, resulting in severe flooding, damage to infrastructure, and erosion reducing usable land.

Even if the overall quantity of precipitation is stable, changes to the pattern of how and when it falls is problematic. The same amount of rain concentrated into fewer storms may increase flooding and exceed the capacity of systems designed to capture, manage, and store water. Rainfed agriculture is particularly vulnerable to pattern changes since this type of agriculture relies solely on stable rainfall without the aid of irrigation systems. The majority of farmers in developing countries use rainfed techniques without resources for adaptation. The reverse scenario of more frequent rain events, but of less intensity also generates problems. Light rains may not fully soak into the ground to create runoff and fill irrigation systems, or not soak deep enough to reach the roots and develop healthy plants or recharge groundwater reservoirs. The impacts of both scenarios are similar and most pronounced in the least developed regions where farmers rarely have the capacity to adapt.[37] Effects of rainfall changes are most pronounced in monsoonal regions where dry and rainy seasons define social patterns, dictate growing seasons, and are an all-around central feature of society.[38] Most climate change scenarios anticipate monsoon seasons fluctuating significantly in intensity, time of year, and location.

Of all the threats from changing precipitation, drought is the easiest to comprehend. A decrease in available water over a wide area reduces supplies for plant, animal, and human use.

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[36] NASA, "The Effects of Climate Change."

[37] IPCC, "2013: Summary for Policymakers," 984-990; Jurgen Scheffran, P. Link, and Janpeter Schilling, "Theories and Models of Climate-Security Interaction: Framework and Application to a Climate Hot Spot in North Africa," in *Climate Change, Human Security and Violent Conflict: Challenges for Societal Stability*, ed. Jurgen Scheffran et al. (Berlin: Springer-Verlag, 2012), 94.

[38] IPCC, "2013: Summary for Policymakers," 1225-1234.

Droughts vary in length, sometimes extending a single season and other times stretching multiple years. The longer the drought lasts the greater the impacts as deeply rooted plants, trees, and animals often survive short droughts, but are unable to survive sequential dry years. Drought has the most severe human effects on agricultural and pastoral societies without alternative sources of income.[39] These societies subsist directly from the land, relying on a stable water supply and possess minimal resources to mitigate sustained drought. Security implications of drought first appear in the 1993 *National Security Strategy* which states, "depletion of water supplies have far-reaching effects on the capacity of countries to sustain economic growth."[40] Rural populations often migrate to urban areas when faced with prolonged drought, particularly when their government is unable or unwilling to mitigate the impacts and help people adapt.

The Role of Government: Capacity and Willingness

The potential effects of climate change are far reaching and seem to loom over the future; however, not every country is facing an existential threat. Modern, developed countries are internally focused on relatively small areas. The United States for example is mostly concerned with coastal flooding in Florida, drought in the desert Southwest, and increasingly severe localized weather events.[41] Wealthy nations also have the resources and political institutions to react to environmental changes, both proactively before they occur to minimize damage and afterwards to support displaced or affected populations.

For nations on the other end of the wealth spectrum, climate change often presents existential threats and is of immediate concern. Less developed countries do not have the resources and institutions enjoyed by advanced economies and consequentially cannot effectively

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[39] Halvard Buhaug and Ole Thiesen, "On Environmental Change and Armed Conflict," in Scheffran et al., 46-47; Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," *International Security* 16, no. 2 (1991): 88.

[40] The White House, *National Security Strategy* (1993), 11-12.

[41] US Army War College, *Implications of Climate Change*, 20-21; NOAA, "Climate Change & Global Warming."

manage large scale environmental change. Regions expecting to suffer the most severe impacts of climate induced change comprise a disproportionate number of least-developed states, most of which contain large populations engaged in subsistence agriculture.[42] These people have limited economic flexibility to adapt to changes in the environment on their own, and are usually hard pressed to survive a single failed harvest.

Due to the variation of climate change effects expected regionally and the differing ability of political institutions to mitigate the impacts, challenges to internal national stability are not evenly distributed.[43] While every region in the world has some stable nations, there are numerous "fragile states" containing substantial underlying tensions beyond those created by environmental change.[44] Fragile states are characterized by widespread poverty and little economic development intertwined with competing ethnic, social, political, and religious tensions. External influences beyond the control of fragile states may release these tensions, suddenly tipping the uneasy balance maintaining stability. Existing social and political tensions in fragile states command most of the attention, often preventing the government from mitigating environmental impacts. If the affected population is from a competing social or political group there may not be incentive or political will to redirect resources that would support opposition groups.[45] The lack of governmental action in time of need creates a new source of tension while exacerbating existing tensions and political divides.

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[42] Joshua W. Busby, *Climate Change and National Security: An Agenda for Action* (New York: Council on Foreign Relations, November 2007), 9.

[43] Cuny and Hill, *Famine, Conflict, and Response*, 6-7, 34-37.

[44] Wenche Hauge and Tanja Ellingsen, "Beyond Environmental Scarcity: Causal Pathways to Conflict," *Journal of Peace Research* 35, no. 3 (1998): 303-305; US DoD, *Quadrennial Defense Review* (2010), 85; US Department of Defense, *Report of the Quadrennial Defense Review* (Washington, DC: Government Printing Office, May 1997), 3.

[45] Homer-Dixon, "On the Threshold," 98-104; US DoD, *Report on a Changing Climate*, 15; Carl Schleussner et al., "Armed-Conflict Risks Enhanced by Climate-Related Disasters in Ethnically Fractionalized Countries," *Proceedings of The National Academy of Sciences* 113, no. 33 (2016): 9216-9221.

When environmental change risks the survival of the populace, action is required to assist the people. If the government or other actors do not intervene then the affected population will do what they must to survive. The most common reaction is migrating to areas that offer opportunity, usually rural residents move to urban areas seeking economic opportunities and government resources not available elsewhere.[46] Large numbers of migrants flowing into cities alters the power dynamics, stressing urban capacities as they compete with established residents for limited resources. When migrants entering cities are from competing social or political groups as the original inhabitants the possibility of political balances being upended aggravates existing tensions, increasing the likelihood of conflict.

State boundaries rarely constrain migration, with affected groups frequently crossing international borders in search of opportunity. In similar fashion to internal migration, the influx of foreign migrants strains a government's limited resources and raises tensions with domestic constituents. International migration often extends beyond immediate borders as populations pass through neighboring countries in pursuit of a better life in distant regions. Migrants from sub-Saharan Africa attempting to reach Europe have been a significant destabilizing factor in North Africa, stressing governments ability to manage large numbers of people and allowing the rise of human trafficking and criminal enterprises.[47] This situation is even pressuring the governments of wealthy European countries to respond to a humanitarian crisis, without reducing the quality of life and services demanded by their citizens.

The concentration of disaffected people into tightly packed urban areas is further concerning for states with limited means or political will to protect all segments of the population.

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[46] Homer-Dixon, "On the Threshold," 98-104; Guy J. Abel et al., "Climate, Conflict and Forced Migration," *Global Environmental Change* 54 (2019): 239-249; Nils, "Armed Conflict and the Environment," 9.

[47] Jaroslav Tir and Paul F. Diehl, "Demographic Pressure and Interstate Conflict: Linking Population Growth and Density to Militarized Disputes and Wars, 1930-1989," *Journal of Peace Research* 35, no. 3 (1998): 319-339.

Groups pushed out of traditional lands and concentrated into small areas can communicate easily and coordinate actions.[48] Combined with high rates of unemployment, this sets the stage for demands on the government by a dissatisfied but quick to mobilize group from within important urban areas. Forceful governmental responses to these groups dramatically increases the likelihood of degenerating into violent political conflict, insurgency, and civil war. These are not new concepts unique to climate change.[49] They have occurred throughout history in response to political constraints and competition for resources. Climate change does however offer a new trigger and impetus to compete for resources as evidenced by the Syrian civil war.

Case Study: Russia Seizes the Advantage in Syria

The MENA region has a history of instability and frequent conflict, recently attenuated by a dramatic rise in uncertainty as protest movements swept through numerous authoritarian states in 2010. Early 2011 witnessed the toppling of dictators in Tunisia and Egypt as Libya devolved into civil war due to Muammar Qaddafi's long and harsh grip on power. These events along with others throughout the MENA region are known as the Arab Spring, popularly regarded as oppressed populaces standing in righteous defiance of repressive authoritarian regimes.[50] By late spring 2011 most nations wondered which dictator was next to fall. Most Arab Spring protests involved stark ethnic and sectarian divisions with regimes directing resources to their own ethnic group while marginalizing and violently repressing others. By easily fitting the basic criteria, most eyes fell on the Syrian Arab Republic, led by Bashar Al-Assad.

The common account of the Syrian Civil War follows the overarching Arab Spring narrative, with the enmity of an oppressed population boiling to the surface as they rise against a

[48] Cuny and Hill, *Famine, Conflict, and Response*, 10.

[49] Mabey, *Delivering Climate Security*, 116-119.

[50] William Cleveland and Martin Bunton, *A History of the Modern Middle East* (Boulder, CO: Westview Press, 2016), 538.

tyrannical dictator. The oppressed people yearn for freedom and self-determination, while democratic underpinnings provide moral rightness in resorting to the use of violence. The Syrian case applies since Assad's violent suppression of peaceful protests sparked further outrage and opposition, ultimately mobilizing the populace against his regime. Syria's narrative departed from those of Tunisia and Egypt when Assad chose to fight rather than peacefully turn over power. This transformed a peaceful protest movement into a full-scale civil war, pitting a conventional army against civilians and loosely organized rebel groups. Further complicating the political landscape, extremist Islamist groups entered the fray, attempting to capitalize on the power vacuum emerging in the Syrian countryside. From these groups the Islamic State of Iraq and the Levant (ISIL) faction emerged, attempting to carve out an extremist caliphate from Syria and Iraq. Instead they brought international attention, with the United States and Russia entering the conflict.[51]

Despite sounding feasible, this narrative does not adequately capture the Syrian war since it only applies a wide-angle lens and cannot bring the details and linkages into focus. Assad certainly meets the criteria of an Arab Spring dictator, having ruled for ten years after taking over from his father who founded the regime thirty years prior. The problem is Syria was one of the most stable countries in the region despite major conflicts on its borders in Lebanon, US intervention in Iraq, and supporting terrorists targeting Israel.[52] Syria is a much longer and more complex story than the common narrative, requiring closer analysis and consideration for the unique context present.

The starting point is the exceptionally diverse population of Syria. Sunni Muslims form the largest group in Syria, comprising over sixty percent of the populace and conducting the

[51] Sam Dagher, *Assad or We Burn the Country: How One Family's Lust for Power Destroyed Syria* (New York: Little, Brown and Company, 2019), 4-7.

[52] Emile Hokayem, *Syria's Uprising and the Fracturing of the Levant* (New York: Routledge, 2013), 11-13; Dagher, *Assad or We Burn the Country*, 127-128.

majority of agricultural production. Despite holding the majority, Sunni Arabs are not the power brokers in Syria. That status belongs to the minority Alawite ethnic group from the northern Syrian coast that took control in 1970 with the rise of the secular Ba'ath Party. The Alawites are adherents of Shia Islam, but are a unique sect, comprising roughly ten percent of the Syrian population of 22 million. The third major group are Kurds accounting for another ten percent. Like Sunni Arabs, Kurds are an outgroup and rely almost exclusively on agriculture along the Turkish and Iraqi borders.[53] Syria encompasses much of the historic Levant, an area of rich history containing diverse ethnic and religious groups. These small, mostly non-Islamic groups have constant security concerns in the Muslim dominated region. Assad's secular government answered these fears by providing security for smaller groups in return for political alliance.[54] Like other authoritarian regimes, the majority of resources available in Syria were disproportionately concentrated on the minority Alawites and allied groups.

Beyond domestic alliances the Assad regime enjoys support from outside actors owing to its strategic location on the Eastern Mediterranean Sea and sharing borders with Israel and Lebanon. Iran maintains close ties to Assad, enabled by a shared Shia faith supporting Hezbollah and other terror groups opposing Israel. Russia has a long and friendly relationship with Syria, notably with a naval base in Tartus, which was long the only Russian military base abroad and positioned to provide guaranteed access for Russia to the Mediterranean.[55]

The primary problem with the common narrative of Syria is time. Certainly, the Sunni majority was not satisfied with the Assad regime in 2011 when the conflict erupted, but why did they not revolt sooner? The Ba'ath party under Bashar's father Hafez al-Assad, took control of

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[53] Hokayem, *Syria's Uprising*, 17, 19.

[54] Cleveland and Bunton, *A History of the Modern Middle East*, 548-550; Hokayem, *Syria's Uprising*, 17-18, 30-33.

[55] Cleveland and Bunton, *A History of the Modern Middle East*, 548-550; Jeffrey Martini, Erin York, and William Young, *Syria as an Arena of Strategic Competition* (Santa Monica: Rand Corporation, 2013), 2.

the country through political means, rather than solely through force. From the earliest days the Ba'ath Party provided livable conditions throughout Syria, leading the Sunni majority to accept Assad's rule.[56] Hafez al-Assad understood the precarious position a minority ruler occupies, specifically focusing on the welfare of the rural Sunni population by subsidizing and modernizing agriculture to ensure his principal opposition group did not revolt.

The major change in the Sunni situation occurred with Bashar al-Assad's attempts to liberalize the economy after assuming power in 2000. His overarching idea to modernize and grow the economy through greater international cooperation intended to support the entire country while growing regional status and influence. The effort sought to reduce government control over the economy, with agricultural subsidies and programs suffering major cuts. In addition to the cuts, corruption within the ruling elite supporting Assad funneled even more wealth into the Alawite clan at the expense of the Sunni majority.[57] The result of attempting to modernize was isolating a large segment of the populace from government support.

In early 2011 most Sunnis did not support rebellion despite declining government support. The older population vividly remembered the last time Sunnis revolted against an Assad. In 1981 the city of Hama in northwest Syria revolted against Hafez al-Assad's government due to economic hardship and dissatisfaction with the minority regime. When the populace protested peacefully and blockaded the city from security forces, Assad launched a combined arms military assault on the city. As many as 10,000 residents died, the majority of whom were summarily executed as the government retook the city following days of artillery and air bombardment.[58] Seared into the memory of the survivors, the older generation of Sunnis strongly opposed revolting against the Assad regime.

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[56] Dagher, *Assad or We Burn the Country*, 38-41; Hokayem, *Syria's Uprising*, 18.

[57] Hokayem, *Syria's Uprising*, 25-33.

[58] Hokayem, *Syria's Uprising*, 44-45; Dagher, *Assad or We Burn the Country*, 230-237.

Drought Enters the Syrian Equation

The Syrian countryside is a naturally dry environment and no stranger to drought. Even in a normal year rain typically only falls during winter, between November and April. The Levant, which includes all of Syria, Lebanon, Israel, and Jordan, as well as portions of Turkey, Iraq, and Iran, experiences regular fluctuations in precipitation. An annual variance of twenty percent from the baseline is not uncommon.[59] Precipitation measurements in the Levant date to 1889, with further observations available for hundreds of years prior due to the rich history of the region, providing human observations for a longer period than most places on the planet.

In the 1950s the Levant began experiencing droughts of increasing length, with the first recorded drought of three or more successive years appearing in 1955. Multi-year droughts, defined as more than two years of consecutive drought, occurred in the 1950s, 1980s, 1990s, and the most recent beginning in 2006. No drought year is good, but a single year drought causes less damage and recovery is quicker. During multi-year droughts damage compounds, and it typically takes several years of average or higher precipitation for the region to fully recover.[60]

While droughts are a long running feature of life in the Levant and humans have adapted to them, not all droughts are equal. There is a significant difference between a drought just meeting the criteria of a twenty percent decrease and a severe drought where one-third the normal rain falls; a decrease of over sixty percent. From 1900 to 2005, Syria experienced six severe droughts. The first five lasted just a single year, while the sixth was the first severe drought to extend multiple years. This sixth drought lasted from 2006 until 2011, an unprecedented severe drought, with 2008 the driest winter in the Levant's recorded history.[61] Scientific analysis of tree

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[59] Colin Kelley et al., "Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought," *Proceedings of the National Academy of Sciences* 112, no. 11 (March 2015): 1, 3; Ali Massoud, *Years of Drought: A Report on the Effects of Drought on the Syrian Peninsula* (Berlin: Heinrich Böll-Stiftung, 2010), 1-3; Gleick, "Climate Change and Conflict in Syria," 332.

[60] Kelley et al., "Climate Change and Recent Syrian Drought," 3-4.

[61] Gleick, "Climate Change and Conflict in Syria," 332-333.

rings from the Levant and Mediterranean basin offer further evidence of the unparalleled scale of the drought. Tree rings vary annually depending primarily on available water. In dry years trees grow less and the rings are smaller, while wet years have larger rings. Records of tree rings for the Levant provide precipitation measurements dating back to 1100 CE. This analysis corresponds with written historical documents, showing the most recent drought is fifty percent drier than anything in the last 500 years, and at least twenty percent drier than any single event since 1100 CE.[62]

The trend of increasingly severe droughts and the emergence of multi-year droughts is due to anthropogenic caused climate change. This trend corresponds to global surface temperatures that began climbing rapidly in the 1950s, while regional drying closely matches climate models accounting for greenhouse gas inputs from human activity.[63] There are no identified natural explanations of increased drought in the Levant and no similar trends have occurred over the last 900 years. All climate models anticipate this drought trend will continue and likely worsen through at least 2050, with strong indications that the ancient "Fertile Crescent" will disappear within the century.[64] The only models that match current conditions include human generated greenhouse gas emissions. Subtract the greenhouse gases from the equation and Syria's droughts disappear.

The 2006-2011 drought profoundly affected farmers in northeast Syria where rainfall decreases were the most severe and farmers predominantly depended on direct rainfall, causing crop failures from the outset. The drought hit other regions of Syria later as compounding effects

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[62] Benjamin Cook et al., "Spatiotemporal Drought Variability in the Mediterranean Over the Last 900 years," *Journal of Geophysical Research: Atmospheres* 121, no. 5 (2016): 2070-2071.

[63] Kelley et al., "Climate Change and Recent Syrian Drought," 3, 4; Gleick, "Climate Change and Conflict in Syria," 337.

[64] Cook et al., "Drought Variability in the Mediterranean," 2066-2068; Akio Kitoh, Akiyo Yatagai, and Pinhas Alpert, "First Super-High-Resolution Model Projection that the Ancient 'Fertile Crescent' Will Disappear in this Century," *Hydrological Research Letters* 2 (2008): 34.

depleted groundwater and river sourced irrigation systems.[65] The effects disproportionally struck the Sunni population who rely on rainfed cultivation, grow the majority of agricultural produce, and constitute the majority of the rural populace. Rainfed agriculture, where the only source of water available falls from the sky, accounts for two-thirds of Syrian farmers and was first to fail as wheat production dropped fifty percent in 2008.[66] Following the initial wheat failure most other crops failed or production dropped precipitously, including the barley crop that provided eighty-five percent of domestic livestock feed.[67] Irrigation schemes available to some farmers prevented complete initial failure, however the multi-year drought quickly took its toll as groundwater levels dropped and entire rivers dried up.

Food prices across Syria doubled almost immediately along with livestock feed, while seventy-five percent of small and medium farms production and income dropped to zero. With pastures depleted and feed reserves exhausted, pastoralists were forced to sell their livestock at fifty percent or more below cost, reducing herd sizes by sixty percent nation-wide in 2008 alone.[68] Faced with a rapidly diminishing ability to survive farmers increasingly abandoned their homes, migrating to urban areas in search of work. The scale of the drought drove upwards of 1.5 million people into Syria's cities where they mostly settled into periphery areas and makeshift camps, unable to afford the higher costs of established urban life.[69]

Agricultural share of national gross domestic product fell from twenty-five percent pre-drought to eighteen percent in 2008 as urban populations swelled, clear indicators for Assad's

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[65] Kelley et al., "Climate Change and Recent Syrian Drought," 3, 4.

[66] US Department of Agriculture, Foreign Agriculture Service, *Middle East: Deficient Rainfall Threatens 2009/10 Wheat Production Prospects* (Washington, DC, 2008).

[67] Kelley et al., "Climate Change and Recent Syrian Drought," 1-2; Wadid Erian, Bassem Katlan, and Ouldbdey Babah, *Drought Vulnerability in the Arab Region: Case Study - Drought in Syria, Ten Years of Scarce Water (2000-2010)* (Damascus: The Arab Center for the Studies of Arid Zones and Dry Lands; UN Secretariat of the International Strategy for Disaster Reduction, 2011), 25-26.

[68] Erian, Katlan, and Babah, *Drought in Syria, Ten Years of Scarce Water*, 25-26; Kelley et al., "Climate Change and Recent Syrian Drought," 1-2.

[69] Massoud, *Years of Drought on the Syrian Peninsula*, 7.

government to identify a problem. The government began large-scale wheat imports in 2009 as national grain reserves opened the year prior quickly ran out. These efforts did not mitigate high food prices and did nothing to help rural residents whose farms had collapsed.[70] Instead of programs to answer the growing crisis, Assad continued economic liberalization policies with further cuts to irrigation, agricultural modernization, and reduction of farm subsidies. At the same time, he increasingly directed government investment to modern urban infrastructure, away from the displaced people that desperately needed it.

By early 2011 an unprecedented five successive years of drought has taken its toll, pushing rural farming populations to urban centers with few opportunities. Inundated by drought refugees intermixing with those fleeing other regional conflicts, unemployment swelled with half of migrants unable to find work, and crime running rampant through poor neighborhoods. Government help to increase employment, curb crime, or simply ensure the survival of migrants was non-existent, while the Alawite minority continued to gain wealth. The migration of most rural Sunni farmers to the urban periphery of Syria set the stage for the next stage of the complexity route leading from climate change to civil war. The intricacy of internal Syrian politics was beyond Assad's comprehension, driving his failure to evolve strategy over time and maintain a domestic base of power.[71]

Igniting the Tinder

The initial success of the Arab Spring sparked the first Syrian protests in January 2011. Initially very small, early protests featured middle-class Sunni political activists expressing solidarity with Egyptian, Tunisian, and Libyan protesters. The Syrian government responded with overwhelming force, deploying the dreaded Mukhabarat or Syrian secret police. By mid-February

[70] Gleick, "Climate Change and Conflict in Syria," 334; Kelley et al., "Climate Change and Recent Syrian Drought," 1-2; Hokayem, *Syria's Uprising*, 19, 43.

[71] Hokayem, *Syria's Uprising*, 19, 29, 43; Dagher, *Assad or We Burn the Country*, 155-159.

the nature of the protests shifted. Upset by initial government reactions, working class people joined in and the first protest featuring rural laborers emerged in heart of Damascus.[72] In late March the scale of protest and violence escalated dramatically in the southern city of Dara'a following the arrest and torture of several teenagers for spray-painting anti-Assad graffiti. Initially small, the protests grew, finally drawing the attention of the central government when protesters peacefully occupied a local mosque. Concerned as the protesters drew sustained attention and appeared successful, Assad ordered the Mukhabarat to intervene. After negotiating a peaceful settlement, the Mukhabarat instead stormed the mosque, killing several protesters as they surrendered. This triggered further protests both inside Dara'a, and as news of the governments deceit spread, protests emerged in neighboring communities as well.[73] This devolved into a vicious cycle as protests triggered continually escalating government violence, causing increasing casualties among protesters.

April 2011 brought several hundred protesters to the city of Douma just outside Damascus, where government sharpshooters killed twelve protesters without warning. The following day funerals for the twelve brought over 150,000 people into the streets, uniting Sunnis, Christians, tribes, and business groups against Assad. By the end of the month the Syrian Army placed Dara'a under siege with tanks and mechanized infantry, while regular army units deployed nationwide. Escalation continued through the summer of 2011 as opposition groups coalesced and took control of the city of Hama, triggering Assad to launch two armored brigades to retake the city, killing hundreds of residents.[74]

The Syrian conflict escalated into large-scale civil war in summer 2012 when opposition groups effectively countered Assad's forces, and began receiving significant material support

[72] Dagher, *Assad or We Burn the Country*, 7-10.

[73] Dagher, *Assad or We Burn the Country*, 165-178; Hokayem, *Syria's Uprising*, 42-43.

[74] Dagher, *Assad or We Burn the Country*, 192, 195, 218-219, 242-245, 259.

from Sunni Gulf State backers. The United States and European Union condemned Assad's actions and called for his resignation. However, Russia provided political cover by blocking United Nations Security Council resolutions and preventing a coherent international response. By late 2012 Assad began employing all elements of military power including airstrikes and tactical ballistic missiles against rebel groups and sympathetic population centers.[75] The conflict shifted towards extreme violence with Assad's response while complexity increased as numerous rebel groups emerged, all competing for advantage.

Further complexity develops with the growth of extremist Islamist movements, competing with the moderate opposition groups that initiated the protests. Extremists presented grave concerns for external powers, triggering the United States to open a new front in combating terrorism. Likewise, the extremists provided political justification for Russian to support Assad, ostensibly to enable regime forces to combat terrorism. In actuality, Assad released thousands of extremists from prison in early 2012.[76] He did this knowing they would fight the moderate rebel groups and deliver international legitimacy to regime military operations, while simultaneously increasing support from sympathetic Russia.

Fueled by the released prisoners and given physical space to develop, ISIL's spectacular capture of western Syria and northern Iraq in 2014 brought a new urgency to international action. The United States re-entered Iraq to support the fight against ISIL, eventually expanding to operations on Syrian soil. Russian support for 'counter-terrorism' operations turned kinetic in summer 2015 after a direct appeal by Assad that he was facing imminent defeat. Russia's response of missiles and bombing raids exclusively targeted the non-Islamist moderate rebel forces that the US deemed legitimate, while ignoring extremist groups entirely.[77] Russia

[75] Dagher, *Assad or We Burn the Country*, 244, 248-249, 261, 292.

[76] Hokayem, *Syria's Uprising*, 93-97; Dagher, *Assad or We Burn the Country*, 253, 377.

[77] Dagher, *Assad or We Burn the Country*, 338-344, 369, 407.

employed a narrative of supporting a legitimate secular government against terrorists, providing aid to Assad and expanding Russian bases and capabilities within Syria. Despite backing by the US and regional actors, moderate rebel groups fought largely independently, unable to form a cohesive organization that could coordinate and challenge the Assad narrative.

Russian operational and tactical air support provided the critical edge for Assad's ground forces to regain momentum, with close air support targeting enemy fighters while bombers struck civilian populations. With Assad controlling most of the coastline, while the eastern deserts rested in the hands of ISIL, the moderate rebels were stuck in the middle. Both Assad and ISIL focused on the moderate rebel groups, benefiting Assad and Russia since only the moderates posed a threat to Assad's legitimacy. By 2016 the tide turned against the rebels, Assad's forces made continuous gains, Turkey intervened on its border to counter Kurdish groups, and the United States went on the offensive against ISIL.[78]

Into 2020 the conflict is slowly drawing to a close as Assad's forces control most of the population centers while Russian support maintains the military advantage. What moderate rebel groups remain are continually retreating into shrinking areas of control. ISIL as a coherent military or political force has ceased to exist, just scattered remnants remain, hiding across the country and operating below the level of open conflict. There is no question that Assad has won the war and his government will continue to hold international legitimacy for the near future, all due to the intervention of Russia.

Russian Gains

Russia and Syria's close relationship dates to the 1950s when the Soviet Union first began selling arms in the MENA, initially to Egypt and Syria. The partnership solidified in 1971 with the signing of the Soviet Union – Syria Friendship Agreement formalizing the relationship

[78] Dagher, *Assad or We Burn the Country*, 408, 433; Cleveland and Bunton, *A History of the Modern Middle East*, 548-550.

and establishing a Soviet naval base at Tartus on the Syrian coast. Soviet, and later Russian, military advisors have maintained a constant presence since 1971 despite major political upheavals at home, evidence of a close relationship.[79]

Russia assumed significant military and political risk by involving itself in Syria to block a potential US intervention and save Assad from defeat, but the reasoning why is not immediately apparent. The overarching goal of the Russian Federation is reestablishing its status as a world power on par with the US. Moscow views US-led trends of regime change and humanitarian intervention as a major threat to Russian interests and detrimental to long-term international security and stability.[80] The Syrian Civil War, featuring an authoritarian ruler employing the full range of military capabilities against a 'freedom desiring' civilian populace, presented the perfect opportunity to counter US policy goals. Furthermore, Syria's location in the MENA region provided opportunity to influence Russian economic policy aims of cooperation with oil and gas producing states. The final essential component of Russia's decision is a domestic focused two-level game, shoring up internal confidence in Putin's policies while raising confidence in the military.

Russian political ambition in the MENA region centers on gaining regional influence and power broker status, able to manage conflict and coordinate economic relationships to benefit domestic Russian interests. This achievement has eluded Russia for decades, primarily due to dominant US economic power, and more recently US-led military operations. Russia has gained considerable influence throughout the MENA region by intervening in Syria owing to its

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[79] Nicu Popescu and Stanislav Secrieru, eds., *Russia's Return to the Middle East: Building Sandcastles* (Paris: Chaillot Paper no. 146, European Union Institute for Security Studies, July 2018), 14, 17, 20, 37; Trenin, *Russia in the Middle East,* 3; Cleveland and Bunton, *A History of the Modern Middle East,* 548-550.

[80] Popescu and Secrieru, eds., *Russia's Return,* 21, 23, 48; Dmitri Trenin, *Russia in the Middle East: Moscow's Objectives, Priorities, and Policy Drivers* (Moscow: Carnegie Endowment for International Peace, 2016), 1, 2; James Sladden et al., *Russian Strategy in the Middle East* (Santa Monica, CA: Rand Corporation, 2017), 7, 8.

willingness to work with states with poor human rights records, and with leaders at odds with US policy. Aside from Syria, the clearest example of this willingness is with Iran. Russia has long maintained a working relationship with the Iranians, but not overly close ties. The common interest of preserving Assad's regime has brought them much closer. This is primarily through direct military cooperation in Syria that has facilitated closer political ties. Military operations have exceeded simple coordination in time and space. Russian strategic bombers have based from Iranian airbases to conduct bombing missions in Syria, the first foreign military to operate from Iranian soil since 1979. Close ties with Iran provide Russia intelligence, and contact with Hezbollah and the Iranian Revolutionary Guards Corps, both actors with a stated intention of destroying Israel. This positions Russia as a major influencer of Israeli security through a position of power over their principal enemies.[81]

The initial relationship between Turkey and Russia was strained over support to Assad, culminating with a Russian bomber shot down near Turkish airspace. Over time the tension diffused, and the Syrian conflict has vastly improved Russian ties with the North Atlantic Treaty Organization member. The relationship improved enough that Russia supported a limited Turkish incursion onto Syrian soil to establish a buffer zone across the border in 2018, against Assad's wishes. Further, close ties are evidenced with recent joint Russian-Turkish army patrols in that buffer zone. Beyond Syrian operations, Russian cooperation extends to exporting advanced weapons to Turkey, notably the S400 air defense system which led the United States to cancel Turkish participation in the advanced F-35 fighter program.[82] Close bonds with Turkey are essential for Russia to guarantee access from the Black Sea to the Mediterranean through the Bosporus strait, enabling viable power projection to the MENA region.

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[81] Popescu and Secrieru, eds., *Russia's Return*, 5, 65; Putin 6; Dagher, *Assad or We Burn the Country*, 387; Ellie Geranmayeh and Kadri Liik, *The New Power Couple: Russia and Iran in the Middle East* (London: European Council on Foreign Relations, September 2016), 1, 4, 13.

[82] Popescu and Secrieru, eds., *Russia's Return*, 95-99.

Another goal for Russian influence includes the Persian Gulf economic power players of Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. Russia needs relationships with the Gulf states because they possess potential for foreign investment and trade independent of the United States and Europe. This is essential due to Russia's current dependence on European trade which exposes them to US sanctions.[83] The primacy of US alliances in the Middle East has left a minimal role for Russia; however, the Gulf states have significant interests in Syria and the outcome of the conflict. Russian power in Syria has opened lines of communication to the Gulf states and is opening new economic and military opportunities.

Russia has always wanted a true client state in the MENA region, a state directly controlled in pursuit of Russian interests. Historically Russia has not been able to gain enough leverage over a Middle Eastern state to force it to do its bidding.[84] This changed with Syria in 2015 when Assad faced an existential threat to his survival and was forced to appeal to Moscow for direct intervention. Waiting in the wings for years, Russia seized an opportunity to gain direct influence in the region and substantial military basing options that provide expeditionary potential in the Mediterranean and the Middle East.

Influence with the Middle Eastern oil industry is a vital Russian interest because their economy is centrally reliant on energy exports, comprising more than half of the Russian economy. Additionally, accounting for seventy percent of exports, split between natural gas which Russia dominates globally, and petroleum where it stands as the second largest exporter. Control over the Syrian government brings Russia to the Middle East's leadership table, providing leverage to help maintain high energy prices to sustain the Russian economy. This has bourn substantial benefits for Moscow since 2018, achieving formal cooperation with the Organization of Petroleum Exporting Countries, of which Russia is not a member, to cut

[83] Dagher, *Assad or We Burn the Country*, 387; Popescu and Secrieru, *Russia's Return*, 83-93.

[84] Popescu and Secrieru, eds., *Russia's Return*, 52; Cleveland and Bunton, *A History of the Modern Middle East*, 548-550.

production and maintain high prices. Without influence over Syria, Turkey, and Iran, along with stability of the MENA region, Russia would not be able to achieve economic benefits.[85] Further incentive for Russian interests lie with the geographic position of Syria linking the Arab world to Europe through the Mediterranean and Turkey.[86] The majority of Russian natural gas is sold to Europe, which does not have an alternate source capable of providing equivalent volume. This provides Russia with influence over European energy policy, with the goal to prevent outside competition. Affordable access to Arab oil and gas through pipelines would afford Europe an alternative to Russian energy that is geographically feasible only through Syrian soil.

The Russian military was the primary tool used to rescue the Assad regime, putting military hardware, capabilities, and overall competence on display. Highly successful at the end of 2019, intervention has come at a relatively low price for Russia. Fewer than 100 servicemembers have been killed in combat, with a few hundred wounded. Russia has mitigated military risk predominantly through air operations supporting Assad's ground forces and Iranian allies, losing just a dozen aircraft to accidents and enemy fire.[87] These operations have cost an estimated $2.5 billion over four years.[88] The cost is minimal when compared to the blood and

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[85] Central Intelligence Agency, *The World Factbook* (Washington, DC: 2020), accessed January 17, 2020, https://www.cia.gov/library/publications/resources/the-world-factbook/index.html; Alexander Metelitsa, *Oil and Natural Gas Sales for Russia: 2013* (Washington, DC: US Energy Information Administration, 2014), 1-2; Popescu and Secrieru, eds., *Russia's Return*, 30-32; Stephen Blank, "Beyond Syria: Moscow's Objectives in the Middle East," *New Atlanticist* (blog), *The Atlantic*, April 17, 2018, accessed January 15, 2020, https://www.atlanticcouncil.org/blogs/new-atlanticist/beyond-syria-moscow-s-objectives-in-the-middle-east/; Trenin, *Russia in the Middle East*, 1-2.

[86] Sladden et al., *Russian Strategy in the Middle East*, 2, 3, 9-11; Trenin, *Russia in the Middle East*, 1-2; Nikolas K. Gvosdev, "Russian Strategic Goals in the Middle East" in *Russia's Policy in Syria and the Middle East: Determination, Delight, and Disappointment*, (CAP paper no. 212, Institute for European, Russian, and Eurasian Studies: The George Washington University, 2019), 4-8.

[87] Trenin, *Russia in the Middle East*, 2; Popescu and Secrieru, eds., *Russia's Return*, 52.

[88] US Department of Defense, Comptroller, *Estimated Cost to Each U.S. Taxpayer of Each of the Wars in Afghanistan, Iraq and Syria* (Washington, DC: Office of the Under Secretary of Defense (Comptroller), 2019), accessed January 15, 2020, https://comptroller.defense.gov/Home/Section1090Reports/; US Department of Defense, *DoD Casualty Status* (Washington, DC: January 20, 2020). US operations in Afghanistan average $50 billion annually in direct spending for close to $1 trillion since the start of the war, and an average 130 fatalities per year for over 2300 total as of January 2020.

treasure the United States has expended in Afghanistan after eighteen years with the outcome still uncertain.

Syria serves as a real-life testbed for Russian weapons to prove capabilities while simultaneously identifying shortfalls and implementing solutions. To date, Russia has tested more than 200 weapons and weapon systems in Syrian combat, as directly stated by Russian President Vladimir Putin.[89] Demonstrated weapons include the air, sea, and subsurface launched Kalibr Cruise Missile which provides strategic stand-off capability. Bomber and ground attack aircraft have conducted thousands of combat missions, validating the Russian aerospace industries relevance in modern combat and evaluating newly developed aircraft and targeting systems.[90] New to the Russian inventory are precision guided weapons which were extensively tested in Syria, resulting in identifying accuracy and reliability problems in combat conditions. The complexity of the Syrian conflict with a multitude of external forces in close proximity offered a rare opportunity for Russia to test advanced radars and aircraft against US and allied systems. Known examples include fine tuning radar systems to counter US stealth technology advantages in and directly evaluating the SU-57 stealth fighter against US radars and aircraft.[91] This experience in Syria led to re-engineering numerous weapons, considerably increasing their effectiveness in future conflicts.

Beyond physical weapon systems, Russia has continuously exploited the Syrian conflict to gain and distribute experience throughout its professional military force. To date some eighty percent of Russian fixed and rotary wing aviation crews have rotated through Syria, gaining combat experience and familiarity with US and allied military operations. Despite the emphasis

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[89] Interfax-Russia, "Putin Announced the Use of 215 Modern Weapons in Syria" January 30, 2018, accessed January 15, 2020, https://www.interfax.ru/russia/597769.

[90] Michael Kofman, "Russian Combat Operations in Syria and Their Impact on the Force," in *Russia's Policy in Syria and the Middle East: Determination, Delight, and Disappointment,* CAP paper no. 212, *Institute for European, Russian, and Eurasian Studies: The George Washington University*, January 2019, 23-24.

[91] Trenin, *Russia in the Middle East*, 2; Popescu and Secrieru, eds., *Russia's Return*, 40.

on air support at least 50,000 Russian Army soldiers have also deployed to Syria gaining combat experience and familiarity with partner forces. Assad's information operations group, the Syrian Electronic Army, is supported by the extensive Russian information operations enterprise and relies on servers residing in Russia.[92] This force is successful at countering extremist groups and selling the broader narrative of the Assad regime, a legitimate and viable government for Syria. This proficiency expands Russian capabilities and reputation in modern information warfare.

Displaying military capabilities in actual combat, along with gaining regional influence provides significant boosts to Russian arms sales. Sales in the MENA region have increased since the Syrian intervention, rising from thirty-six percent of all Russian foreign military sales in 2015 to more than fifty percent just two years later. The greatest increase in exports to the region have been combat aircraft and attack helicopters, the most widely utilized Russian platforms in Syria and credited with tipping the balance in Assad's favor. The open door to the Middle East is currently fueling Russian joint technology development of advanced aircraft, radar, and associated technology with Saudi Arabia, Qatar, United Arab Emirates, and Bahrain.[93] Joint development of advanced weapons supports growth of other industries, and establishes long-term partnerships. This is exactly what Russia has long desired in the region, and provides benefits beyond economic advancement.

Geography plays a major role in Russia's interests with the benefit of expanded basing opportunities. The naval facility at Tartus was the sole Russian military base in the region prior to conflict, limited to replenishment and maintenance activities. Today Tartus is a full-scale naval base with permanently stationed warships, repair facilities, and munitions stores. Latakia airbase transitioned from a Syrian facility with limited Russian landing rights into a full-fledged Russian airbase with assigned fighters, bombers, and reconnaissance aircraft and all the facilities to

[92] Popescu and Secrieru, eds., *Russia's Return,* 54; Dagher, *Assad or We Burn the Country*, 380; Trenin, *Russia in the Middle East,* 2.

[93] Trenin, *Russia in the Middle East*, 2; Popescu and Secrieru, eds., *Russia's Return,* 38-39, 42.

maintain them. Numerous other locations have Russian facilities in active use for combat operations and regional intelligence gathering. Russia also deployed advanced air defense systems to Syria ostensibly to defend its bases, but with the added effect of limiting US and allied forces the ability to conduct unilateral action in the region without Russian coordination. These systems provide added leverage over Israel, prior coordination is now necessary for Israeli strikes against Hezbollah and other terrorist groups that use Syria as a staging ground.[94]

Military access to Syria in combination with proven competence of the military has re-established Russia as a major player capable of projecting power beyond its borders. Russia justifies military action in Syria under the United Nations Charter, defending the internationally recognized borders of a legitimate government against terrorists and criminals who do not hold legal status. All of this is in line with Putin's stated goal of ending US led humanitarian interventions and regime change justifications.[95] Russia is continuing to gain advantage in the international political and economic arena, primarily at the expense of US influence in the same areas. All this sparked by an unprecedented climatic event, the likes of which will occur again in the near future.

Anticipating and Preparing for Change

The Syrian case offers an in-depth look at climate change fracturing a society and plunging it into chaos. But Syria is not the singular vulnerability. Potential for climate induced conflict abounds in diverse settings and wide-ranging scenarios across the globe. Adapting to many scenarios will exceed government capacity and offer opportunities for external actors to intervene to their advantage. The climate is continuing to change and while some effects are known others will suddenly emerge. The US military has options available to maintain the

[94] Popescu and Secrieru, eds., *Russia's Return,* 52-55; Trenin, *Russia in the Middle East,* 3.

[95] Vladimir Putin, *Foreign Policy Concept of the Russian Federation* (Moscow: The Ministry of Foreign Affairs of the Russian Federation, November 30, 2016).

advantage and deny opportunities to opponents. The next stage of analysis reviews likely scenarios for the near future and how competitors are already positioning to seize emerging opportunities.

When facing a multifaceted problem, the ideal approach is to solve at the source, but the size and complexity of the climate precludes a total solution. There are international policy initiatives attempting to limit and mitigate the long-term effects of climate change through greenhouse gas reductions and carbon capture schemes, but these cannot prevent the near-term effects. It took a half century for the climate to show a response to greenhouse gas emissions and at least an equivalent delay is expected for them to begin diminishing.[96] The climate will continue to change unabated in the interim, sea levels will continue to rise alongside temperatures, while rainfall shifts and extreme weather increases. Resource availability will decrease, threatening food security and increasing amounts and sources of refugees.[97] Earth's complex adaptive climate dictates that not all eventualities can be predicted, some will surprise and shock human systems.

Potential Scenarios

Climate change is generating numerous effects manifesting now or arising in the near future, and the Syrian drought turned civil war is just one example of a changing climate fracturing a society. Climate models for the MENA region forecast precipitation bands shifting north, resulting in the Syrian drought becoming the new normal as the drying trend expands

[96] J. Rogelj et al., "2018: Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development," in *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, ed. Masson-Delmotte et al. (Intergovernmental Panel on Climate Change, 2019), 95-97.

[97] US Department of the Army, Training and Doctrine (TRADOC) Pamphlet 525-92, *The Operational Environment and the Changing Character of Warfare* (Washington, DC: Government Printing Office, 2012), 9; Alfonso P. Castro, Daniel C. Taylor, and David Brokensha, *Climate Change and Threatened Communities*, (Warwickshire: Practical Action Publishing, 2012), 49.

across the Arabian Peninsula and North Africa.[98] This is not a newly identified trend, US strategic documents dating from early 1990s identify a drought scenario in the MENA region causing regional instability and conflict.[99] The only governments with the resources to mitigate extended droughts in the region are the Gulf states and Saudi Arabia which contain a fraction of the vulnerable population. The likely results are widespread food security problems, with the poorest elements of society losing their livelihoods. This will lead to open discontent with government responses, the same conditions that generated the Syrian civil war.

Shifting precipitation bands present similar dangers for sub-Saharan Africa, a region with numerous fragile states where governments struggle to exert control over territory in the best conditions, now expecting thirty to fifty percent reductions in rainfall in coming years. China has made significant inroads throughout Africa pursuing mineral resources to sustain industry and building large commercial farms exporting products for domestic Chinese consumption.[100] Concerns for sub-Saharan Africa run deep through US policy, identified as a primary threat in security strategy documents throughout the 1990s.[101] These relationships are enabled by China's policy of noninterference in domestic affairs abroad, ignoring human rights abuses and corruption issues that preclude US and European Union investment in the same areas. The results of Chinese investment are benefits channeled to wealthy urban minority populations with control over the

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[98] Hans G. Brauch, "Policy Responses to Climate Change in the Mediterranean and MENA Region During the Anthropocene," in Scheffran et al., 719-721, 749-748; Busby, *Climate Change and National Security,* 9; Jeffrey Mazo, *Climate Conflict: How Global Warming Threatens Security and What to Do About It* (London: The International Institute for Strategic Studies, 2010), 104-109.

[99] White House, *National Security Strategy* (1994), 26; Kate Guy et al., *A Security Threat Assessment of Global Climate Change: How Likely Warming Scenarios Indicate a Catastrophic Security Future* (Washington, DC: The Center for Climate and Security, February 2020), 38-39.

[100] IPCC, "2019: Summary for Policymakers Draft," 3-35, 3-38, 3-44, 5-30, 5-42, 5-104, 7-4; Jeffrey Herbst, *States and Power in Africa: Comparative Lessons in Authority and Control,* (Princeton, NJ: Princeton University Press, 2000), 255; Mazo, *Climate Conflict,* 104-109; Brauch "Policy Responses in the MENA," 749; Eleanor Albert, "Backgrounder: China in Arica," *Council on Foreign Relations*, July 12, 2017, 2-5.

[101] White House, *National Security Strategy* (1994), 15; The White House, *A National Security Strategy of Engagement and Enlargement* (Washington, DC: Government Printing Office, 1995), 18; The White House, *National Security Strategy* (1997), 22.

government and national resources. As the climate balance tips and rural populations are threatened, the people will require governmental or outside support. China's interest is protecting their investments and access to resources, chiefly through preserving the status quo in the government. In cases where these governments continue to ignore rural populations, conflict becomes more likely, and with it increased terrorism and migration.

Moving to the east, Pakistan presents the next climate threat. A major terrorism problem along the Afghan border, coupled with a decades long border dispute and nuclear standoff with regional powerhouse India presents a complex problem. Changes to the environment are already emerging in the country of over 200 million people, particularly with the Indus River which provides over ninety percent of freshwater for consumption and agriculture nationally. Flowing from headwaters high in the Himalayas to a wide delta in the Indian Ocean, the Indus has experienced unprecedented floods since 2010. These are due to melting glaciers and intense rainfalls and have displacing millions while destroying large swaths of agriculture. Furthermore, severe droughts and record temperatures are becoming the norm, and sea level rise is destroying natural barriers protecting the capital city Karachi from increasingly strong storms.[102] As these trends accelerate Pakistan will be unable to feed itself, creating 30-40 million climate refugees with nowhere to go. With the current US relationship strained, Pakistan will turn to other actors to manage the environmental changes underway. China is already working to secure this opportunity, developing the China – Pakistan Economic Corridor linking western China directly to the Indian Ocean. This provides influence in the long-running border dispute between Pakistan and China's main regional competitor India.

Potential challenges also appear east of India where Bangladesh holds status as one of the most climate threatened states on the planet. The country consists of a low elevation coastal plain

[102] Sualiha Nazar, "Pakistan's Big Threat Isn't Terrorism-It's Climate Change," *Foreign Policy*, March 4, 2016, 2-5; The White House, *National Security Strategy* (1994), 26; Kate Guy et al., *Threat Assessment of Global Climate Change* (2020), 37.

formed by the deltas of three rivers, with a population of 165 million people. Water is the principal threat as floods raging downstream increase, and where a three-foot sea-level rise would reduce land area by twenty percent and displace over 30 million people.[103] These effects combine with an overwhelmingly poor populace and a willing but under resourced government.[104] Direct neighbors offer little help as religious tensions with India and Myanmar preclude accepting large numbers of Muslim refugees, and struggle with their own internal climate adaption.[105] Again, China is positioned to benefit from climate generated opportunity, offering investment in infrastructure and industry in exchange for influence over the Bangladeshi government. China's main interest is putting pressure on regional competitor India, threatening to surround the subcontinent with competing economic corridors through Bangladesh and Pakistan.

The South Pacific Ocean is a vast region of island nations essential to strategic competition and directly threatened by climate change. Influence delivers basing options which provide maritime connections between the United States and Australia, and access to important areas of southeast Asia. Sea level rise and strengthening cyclones are the main concerns, expecting to completely inundate the Marshall Islands in thirty to fifty years. Vanuatu recently suffered unprecedented damage from the strongest cyclone in its history, and Kiribati which was once safe from cyclones now deals with them annually.[106] These nations are actively pursuing climate change mitigation but with few resources available are turning to external actors for help.

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[103] Sujan Saha, "Security Implications of Climate Refugees in Urban Slums: A Case Study from Dhaka, Bangladesh," in Scheffran et al., 600-601.

[104] Md. Mustafa Saroar and Jayant K. Routray, "Climate Awareness and Adaptation Efficacy for Livelihood Security Against Sea Level Rise in Coastal Bangladesh," in Scheffran et al., 577-579, 589.

[105] Robert Glennon, "The Unfolding Tragedy of Climate Change in Bangladesh," *Guest Blog, Scientific American,* April 21, 2017, accessed February 12, 2020, https://blogs.scientificamerican.com /guest-blog/the-unfolding-tragedy-of-climate-change-in-bangladesh/; Austin Bodetti, "Bangladesh's China-India Balance," *The Diplomat,* May 06, 2019; Kate Guy et al., *Threat Assessment of Global Climate Change* (2020), 48-49, 51.

[106] Achim Maas and Alexander Carius, "Territorial Integrity and Sovereignty: Climate Change and Security in the Pacific and Beyond," in Scheffran et al., 653-655; Kate Guy et al., *Threat Assessment of Global Climate Change* (2020), 48-49, 51.

Seizing the opportunity is China, investing heavily in the region with infrastructure to mitigate environmental changes and expand economic prospects. The influence and relationships China is building opens the door for increased cooperation and potential for military bases that would prevent the US military from even approaching the Asian continent in the event of conflict.

Southeast Asia brings the final climate scenario as shifting rainfall and increasing temperatures threaten agricultural productivity throughout the region. Vietnam, Cambodia, Papua New Guinea, and Malaysia expect major decreases of staple crops of rice, wheat, and soybeans. This threatens both domestic food security and export markets dependent on them. As these states seek outside investment to manage environmental changes, opportunity surfaces for strategic competition. This manifests chiefly through foreign investment conditioned on mutual security agreements and military partnerships.[107] China is pursuing these opportunities aggressively, expanding control over the South China Sea through military cooperation and with agreements to deny collaboration with the United States. Both approaches reduce US ability to freely operate in the South China Sea and protect one of the most important shipping routes in the world.

Military Approaches

Potential scenarios continue well beyond the examples above, and many known and unanticipated challenges will unfold in coming years. Policy responses to climate change writ large are beyond the scope of the military, however the impacts are well within military concerns. All the scenarios considered require a whole of government approach considering economic, political, and military mechanisms appropriate to each situation.

The ideal military approach is developing and improving partnerships and alliances in areas most vulnerable to climate change and that also hold strategic importance. Allies and

[107] C. Peter Timmer, "Food Security and Sociopolitical Stability in East and Southeast Asia," in Barrett, 456-457; James A. Winnefeld and Mary E. Morris, *Where Environments and Security Strategies Meet: Green Conflict in Asia and the Middle East*, (Santa Monica, CA: Rand Corporation, 1994), 35-36, 95-97; IPCC, "2019: Summary for Policymakers Draft," 6-83, 7-4, 7-13, 7-18; Kate Guy et al., *Threat Assessment of Global Climate Change* (2020), 48-49, 51.

partners is a long-standing approach of the DoD, appearing in National Defense Strategies, National Military Strategies, and Quadrennial Defense Reviews under every administration in the last forty years.[108] And security cooperation has been identified as the primary DoD intervention for environmental change scenarios since at least 1994, with specific mention through most strategy documents published since.[109] Positive relationships provide access to information to track environmental change and its impacts on people, while at the same time identifying threats, and building paths to coordinate support. Relationships should not be restricted to actors completely meeting US humanitarian and democratic principles. Working relationships with these states affords influence and resources that can prevent a bad situation from becoming worse. Offering everyone US cooperation counters approaches by strategic competitors; the goal is to avoid creating another Syrian situation where the regime had only one option for survival.[110]

Deliberate planning for climate induced disasters and the social instability that will result provides another way to mitigate the effects of climate change and deny challengers opportunities. Blending scientific analysis that identifies climate impacts with knowledge of social and political conditions identifies where crisis is likely to emerge, and offers insight into plausible solutions. This does not require any new organizations or capabilities, just the

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[108] US Department of Defense, *The National Defense Strategy of The United States of America* (Washington, DC: Government Printing Office, 2005), 1, 4; US Department of Defense, *2008 National Defense Strategy* (Washington, DC: Government Printing Office, 2008), 1, 15; US Department of Defense, *Summary of the 2018 National Defense Strategy of The United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: Government Printing Office, 2018), 1-2, 15; US Department of Defense, Joint Chiefs of Staff, *National Military Strategy of the United States* (Washington, DC: Government Printing Office, 1995), ii, 5, 13; US Department of Defense, Joint Chiefs of Staff, *National Military Strategy of the United States* (Washington, DC: Government Printing Office, 2004), 1, 12, 23; US Department of Defense, Joint Chiefs of Staff, *National Military Strategy of the United States* (Washington, DC: Government Printing Office, 2008), 1, 15; US Department of Defense, Joint Chiefs of Staff, *Description of the National Military Strategy 2018* (Washington, DC: Government Printing Office, 2018), 2, 4; US Department of Defense, Joint Chiefs of Staff, *National Military Strategy of the United States* (Washington, DC: Government Printing Office, 1992), 1, 8; US DoD, *Quadrennial Defense Review* (1997), 3; US Department of Defense, *2001 Quadrennial Defense Review Report* (Washington, DC: Government Printing Office, September 2001), 1, 14; US Department of Defense, *2010 Quadrennial Defense Review Report* (Washington, DC: Government Printing Office, February 2010), iii, 1, 57.

[109] The White House, *National Security Strategy* (1994), 15.

[110] Busby, *Climate Change and National Security*, 7; US DoD, *Report on a Changing Climate*, 15.

requirement to include potential climate crisis with normal planning efforts underway in combatant commands and other pertinent organizations.[111]

The need to investigate environmental change scenarios and plan for their outcomes is not directly stated in current US policy. This appears to limit the importance of climate risk scenarios, but only if the unfocused wide-angle lens is the only one used. The path to Russian advantage through Syria links the top priority of US foreign policy, maintaining America's preeminence in a competitive world, directly to climate change.[112] The 2018 National Defense Strategy focuses primarily on strategic competition, chiefly countering Russian and Chinese attempts to gain advantage worldwide at the expense of the United States. Military planners addressing climate triggered opportunities are doing exactly this, regardless of political narratives of climate change that ebb and flow over time.[113]

The climate is rapidly changing in ways both known and unknown, changing with it the physical environment that the balance of the world's population relies on for day to day survival. When the changes manifest faster than people can adapt, political structures will be challenged, and conflict is likely to emerge. In the global competition for strategic advantage each crisis offers an opportunity for participants to gain influence and advantage similar to Russia successfully exploiting the Syrian Civil War. Denying these opportunities to adversaries through expanded partnerships and planning efforts will maintain the role of the United States military as a legitimate deterrent and the primary stabilizing force for the world.

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[111] US DoD, *Report on a Changing Climate*, 15-16; David E. Mosher et al., *Green Warriors: Army Environmental Considerations for Contingency Operations from Planning Through Post-Conflict* (Santa Monica, CA: Rand Corporation, 2008), 133-135; Mazo, *Climate Conflict*, 130-137.

[112] The White House, *National Security Strategy of The United States of America* (Washington, DC: Government Printing Office, 2017), 2.

[113] US Department of Defense, *Summary of the 2018 National Defense Strategy of The United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: Government Printing Office, 2018), 1-3.

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