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THE EXISTENTIAL SECURITY THREAT OF CLIMATE CHANGE

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JCSP 44

Exercise Solo Flight

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THE EXISTENTIAL SECURITY THREAT OF CLIMATE CHANGE

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THE EXISTENTIAL SECURITY THREAT OF CLIMATE CHANGE

We must make no mistake, the facts are clear: climate change is real and accelerating in a dangerous manner. Climate change not only exacerbates threats to international peace and security; it is a threat to international peace and security.

—Secretary-General Ban Ki-moon, *Address to UN Security Council*

INTRODUCTION

Mr. Ban addressed the UN Security Council with these introductory words before its 2011 discussion on the topic of possible security implications of climate change. This past summer (2018) the Security Council discussed the topic again, with the Deputy Secretary-General opening the discussion stating, “climate change is inextricably linked to some of the most pressing security challenges of our time.”¹ Over the past thirty years, national policy makers, international organizations, and academics have debated the linkages between climate change and security. While there may be no clear agreement that climate change causes nations to go to war, what has become clear is that climate change is none the less an existential threat to human security and well-being, and as a ‘threat-multiplier’ can further destabilize fragile and failing states to the point of armed violence and internal conflict. This paper examines the thirty-year ‘securitization’ process of climate change from its beginning at end of the Cold War to today’s existential threat acceptance, and focuses on three linkages identified in the UN Secretary-General’s 2009 report on possible security implications of climate change, namely: vulnerability, coping and security, and international conflict. It begins with a brief reminder of the current and predicted state of the Earth’s climate.

¹ United Nations, “Impacts of Climate Change Go Well Beyond ‘the Strictly Environmental’, Deputy Secretary-General Tells Security Council Debate | Meetings Coverage and Press Releases.”

CLIMATE CHANGE—THE THREAT

Warming of the Earth's climate is incontrovertible. The observed global temperature increase from the pre-industrialization average level² to now is 0.78°C³, with predictions showing a continued increase to between 1.5 and 4.5°C above the pre-industrialization average by the end of the 21st century. This can be seen in Figure 1. The observed increase has resulted in impacts on the environment that are typified by an increase in severity and frequency of natural events such as flooding, hurricanes and other severe storms, and desertification. The scientific predictions show a continued increase in frequency and duration of floods,⁴ increase in the frequency of intense (Category 4 and 5) hurricanes and associated rainfall,⁵ and a continued rise in sea levels from the 0.19 metres observed over the past 100 years to between 0.4 and 0.63 metres by the end of this century.⁶ On the other end of the moisture scale, current global warming trends would see “progressive and significant increase in frequency of droughts” throughout Africa, the Mediterranean basin, west and south Asia, Central America with water supply deficits increasing fivefold and the current 1-in-100 year drought occurring ever two to five years by the end of the 21st century.⁷ Additionally, with the Arctic

² The period of 1850-1900 is based on the longest global surface temperature dataset available, and represents the approximation of pre-industrialization surface temperatures. This is described in Intergovernmental Panel on Climate Change, “2013 Summary for Policymakers.”19.

³ Note the 2013 and 2014 IPCC reports use the 1986-2005 reference period dataset giving an increase of 0.61°C while the 2003-2012 dataset shows the continued increase to 0.78°C. As described in *ibid.*5.

⁴ Najibi and Devineni, “Recent Trends in the Frequency and Duration of Global Floods.”

⁵ Knutson et al., “Dynamical Downscaling Projections of Twenty-First-Century Atlantic Hurricane Activity: CMIP3 and CMIP5 Model-Based Scenarios.”

⁶ Intergovernmental Panel on Climate Change, “2013 Summary for Policymakers.”23.

⁷ Naumann et al., “Global Changes in Drought Conditions Under Different Levels of Warming.”3285.

warming at twice the global rate, sea-ice volumes and extents are at record lows with century-end predictions seeing a further decrease of 43 to 94 percent.⁸

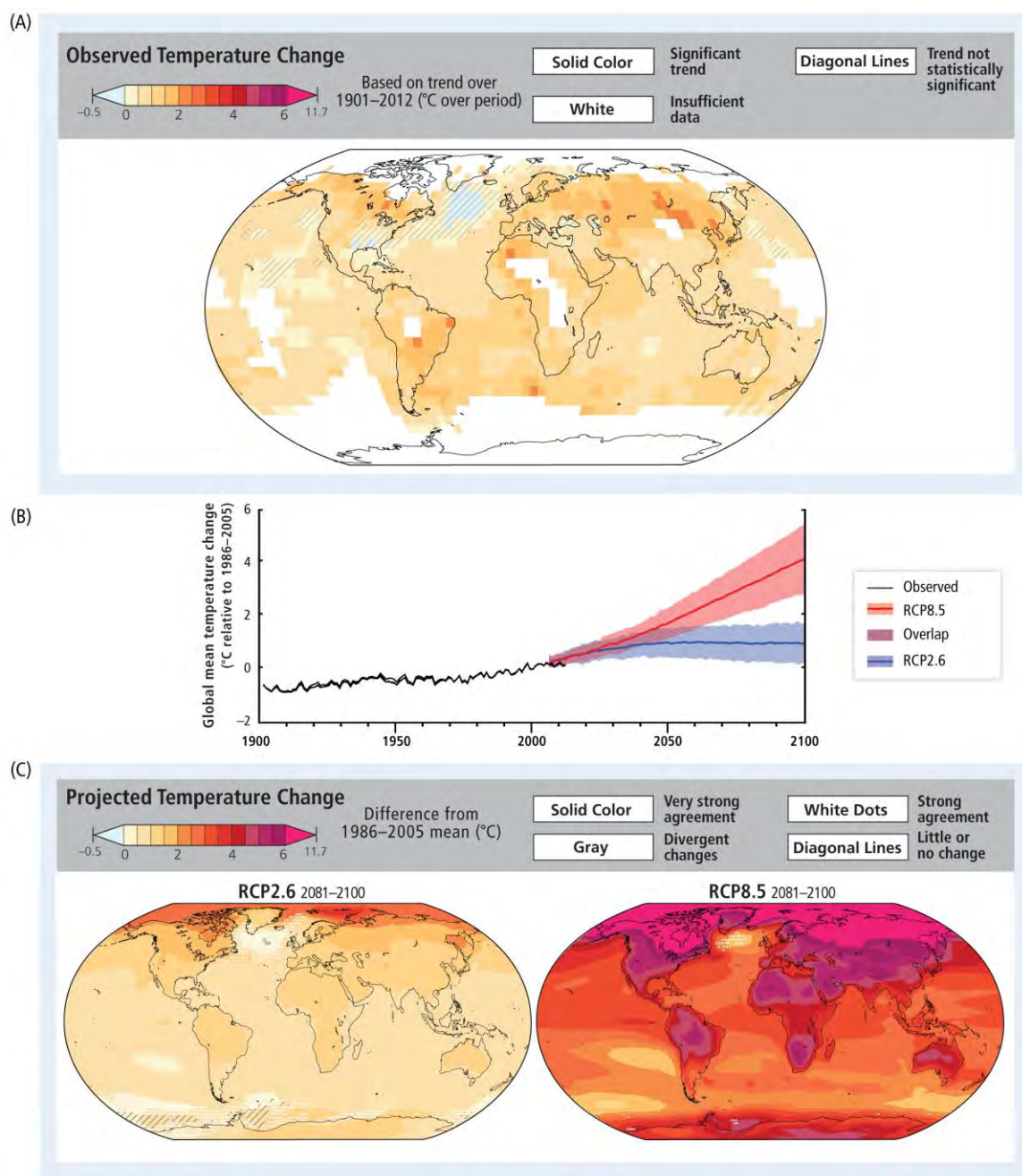


Figure 1—Observed and projected changes in annual average surface temperature. It illustrates temperature change observed to date, as well as the projected warming under ambitious emission mitigation and reduction (a model known as RCP2.6),

⁸ Intergovernmental Panel on Climate Change, “2013 Summary for Policymakers;” “State of the Cryosphere: Sea Ice.”²⁴

and under continued high emissions (RCP8.5).

Source: Intergovernmental Panel on Climate Change, “2013 Summary for Policymakers.”⁹

SECURITIZATION OF CLIMATE CHANGE

Against this backdrop of warming and extreme weather, the past three decades have seen the transition of climate change from a matter considered unrelated to national and international security to the point where it is now seen by many as a clear existential threat to security. The end of the Cold War opened up cognitive space to the idea that security could, and probably should, be about more than just interstate war in a binary super-power world. Some stated that environmental change might well become the ‘driving force’ in the decades ahead the same way nuclear fission was at the start of the Cold War.¹⁰ During the 1990s, environmental security became “an important concept in security studies” yet its meaning remained ambiguous,¹¹ as much of the debate was still mired in the Cold War’s state-on-state mentality and centred on whether environmental degradation was enough to bring two nations to war. Critics bluntly stating “environmental degradation is not a threat to national security.”¹² Others still—perhaps more cynically—attribute the rise of discussion about environmental security, particularly in the United States, to their “entrenched enemy-creation process” and as a justification for continued military spending.¹³

A key step forward in the breakaway from this sovereignty-centred security paradigm was the pivotal 1994 United Nations Development Report. It defined and drew

⁹ Intergovernmental Panel on Climate Change, “2013 Summary for Policymakers.”20.

¹⁰ Mathews, “Redefining Security.”177.

¹¹ Barnett, “Environmental Security.”194.

¹² Deudney, “The Case Against Linking Environmental Degradation and National Security.”475.

¹³ Urban, *Nation, Immigration, and Environmental Security*.105.

attention to the idea of *human security* and its two required fundamental shifts in the concept of security “from an exclusive stress on territorial security to a much greater stress on people’s security, [and] from security through armaments to security through sustainable human development.”¹⁴ This was seen as a global concern, because while previously there were “carefully constructed safeguards against the threat of a nuclear holocaust,”¹⁵—a threat the report said was “always exaggerated”—now there were no global safeguards against the “real and persistent” threats to human security from transnational dangers such as “drugs, HIV/AIDS, climate change, illegal migration and terrorism.”¹⁶ The report listed seven main categories of threat to human security including *environmental security*—the exact definition of which depends on who is asked.

Environmental security generally falls along a spectrum. At one end are those who see environmental security as threat *to* the environment from human activities, while at the other end are those that see nations going to war as a result of climate change.

Throughout the middle of this spectrum are the various effects of environmental change on human security.¹⁷

Just as the language of environmental security and climate change is important, so too is who is speaking that language. Integral to climate change’s securitization process are the ‘speech acts’ by recognized security players demonstrating the need for extraordinary means to address climate change as a security threat.¹⁸ Nations and international organizations have increasingly been making these assertions. The

¹⁴ United Nations Development Programme, “New Dimensions of Human Security.”24.

¹⁵ *ibid.*24.

¹⁶ *ibid.*24.

¹⁷ Barnett, “Environmental Security.”201.

¹⁸ Emmers, “Securitization.”

European Union¹⁹, NATO²⁰, and the G7²¹ have all made the connection and noted its heightened “risk of instability and conflict,”²² with recent calls for the African Union to do the same.²³ China has broken its decades of reluctance on the issue by now agreeing that rising global temperatures are “a root cause of instability.”²⁴ The UN Security Council has now debated the connection three times (2007²⁵, 2011²⁶, 2018²⁷)²⁸ and has acknowledged the link specifically in the cases of West Africa and the Sahel,²⁹ and Somalia.³⁰ The UN General Assembly has noted the Security Council’s debates and has received Secretary-General reports on security implications of climate change³¹, and human security.³² Academics have increasingly participated in the debate, as shown in Figure 2, and analysed the linkages with some coming to the clear conclusion that “climate change has been securitized.”³³

¹⁹ Mogherini, “Mogherini at the High-Level Event ‘Climate, Peace and Security: the Time for Action’.”

²⁰ “NATO - Topic: Environment – NATO’s Stake.”

²¹ “G7 Communique on Climate and Security | UNFCCC.”

²² *ibid.*

²³ Krampe and Aminga, “The Need for an African Union Special Envoy for Climate Change and Security.”

²⁴ Moore and Melton, “China’s Pivot on Climate Change and National Security.”

²⁵ United Nations Security Council, “Security Council Holds First-Ever Debate on Impact of Climate Change on Peace, Security, Hearing Over 50 Speakers | Meetings Coverage and Press Releases.”

²⁶ United Nations Security Council, “Security Council, in Statement, Says ‘Contextual Information’ on Possible Security Implications of Climate Change Important When Climate Impacts Drive Conflict.”

²⁷ United Nations Security Council, *Maintenance of International Peace and Security: Understanding and Addressing Climate-Related Security Risks*.

²⁸ Support for the idea and connection ranged from some delegates praising the initiative and calling for a global summit on the issue, while others saw thought the Security Council as not the correct forum for this debate with it belonging better in, variously, the General Assembly, the Economic and Social Council, and the Commission for Sustainable Development.

²⁹ United Nations Security Council, *Resolution 2349 (2017)*.7.

³⁰ United Nations Security Council, *Resolution 2408 (2018)*.3.

³¹ United Nations Secretary-General, *Climate Change and Its Possible Security Implications: Report of the Secretary-General, a/64/350*.

³² United Nations Secretary-General, *Follow-Up to General Assembly Resolution 64/291 on Human Security: Report of the Secretary-General*.

³³ Elliott, “Human Security/Environmental Security.”17.

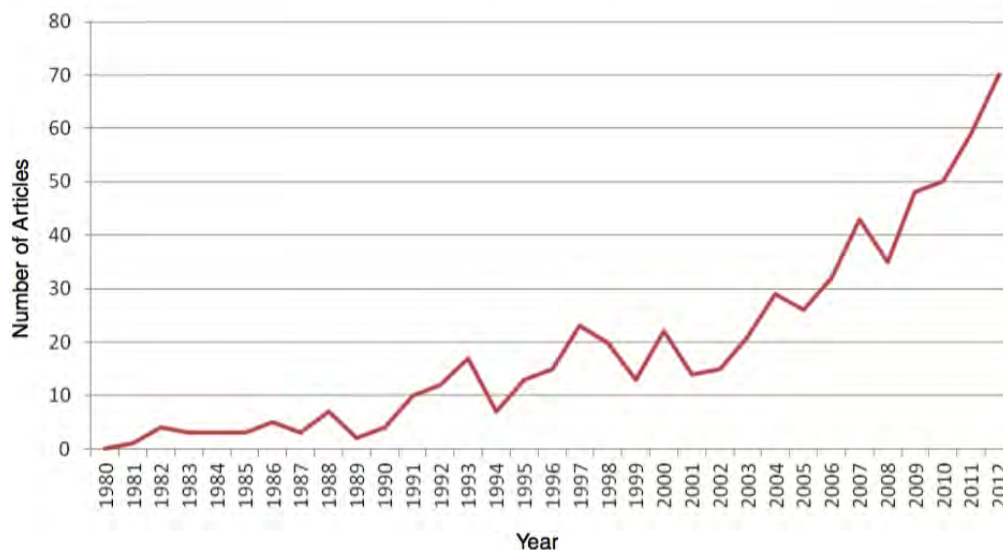


Figure 2—Growth in peer-reviewed literature on climate stress and armed political conflict, 1980–2012.

Source: National Research Council. “Climate and Social Stress: Implications for Security Analysis.”³⁴

SECURITY LINKAGES

What are the exact linkages that these various individuals, organizations, and nations have used to securitize climate change? The 2009 UN Secretary-General’s report collated the responses from “35 Member States, 4 Member State groups, and 17 regional and international organizations including agencies and organizations of the United Nations,”³⁵ and presented five “possible channels through which adverse implications for human or national security might occur”³⁶ as a result of climate change. These channels are:

- Vulnerability—threats to human well-being,

³⁴ National Research Council, “Climate and Social Stress: Implications for Security Analysis.”

³⁵ United Nations Secretary-General, *Climate Change and Its Possible Security Implications: Report of the Secretary-General, a/64/350.4*.

³⁶ *ibid.*4.

- Coping and security—threats from uncoordinated coping,
- International conflict—threats to international cooperation in managing shared resources,
- Development—threats to economic development, and
- Statelessness—threat of loss of territory and statelessness.

The first two were the biggest source of concern, comments and research in the report, and continue to be today as they represent that broad central area in the environmental security spectrum that impacts human security. The third channel, though certainly not the most likely, does probably represent the most dangerous as it sits at the one extreme of the spectrum.

Vulnerability—Threats to human well-being and security

In the context of climate change, human security can be defined as “a condition that exists when the vital core of human lives is protected, and when people have the freedom and capacity to live with dignity,”³⁷ where this vital core includes all the “elements necessary for people to act on behalf of their interests.”³⁸ The Intergovernmental Panel on Climate Change concluded—with robust evidence and high agreement—that “human security will be progressively threatened as the climate changes.”³⁹ This threat is usually felt through the impact of the climate-related extreme weather which can damage infrastructure, kill and injure people, increase displacement

³⁷ Adger, Pulhin, Barnett, Dabelko, Hovelsrud, Levy, Spring, and Vogel, “2014 Human Security.”759.

³⁸ *ibid.*759.

³⁹ *ibid.*758.

and migration of people, and cause food and water insecurity and loss of livelihood.⁴⁰ All of which can ultimately lead to—or are themselves—humanitarian crises.

The numbers truly are telling. In Pakistan in 2010, for example, extreme rainfall led to unprecedented flooding affecting an estimated 20 million people and killed nearly 2000.⁴¹ A total of seven hurricanes and tropical storms hit Haiti in 2004, 2008, and 2016 killing thousands, displacing hundreds of thousands, and massively degrading the country's infrastructure and ability to cope with these and other humanitarian issues.⁴² The 2003 European heat wave killed over 70,000 people,⁴³ with more than half of the heat wave deaths in London and Paris attributed directly to anthropogenic climate change.⁴⁴ Moving beyond immediate mortalities to people affected by severe weather, in 2018 alone, 61.7 million people worldwide were affected by natural hazards,⁴⁵ with 16.1 million newly displaced as a result of weather related disasters such as cyclones, floods, and wildfires.⁴⁶

Access to safe drinking water is recognized as a basic human right and fundamental to maintaining human dignity, as well as sustaining healthy livelihoods.⁴⁷ Thirty percent of the world's population—about 2.1 billion people—do not have readily available access to safe drinking water, with almost half of the world's population drinking from unprotected sources living in Sub-Saharan Africa.⁴⁸ Sub-Saharan Africa

⁴⁰ Intergovernmental Panel on Climate Change, "2014 Summary for Policymakers."

⁴¹ Khan *et al.* 2013 cited in Ruttinger *et al.*, *A New Climate for Peace: Taking Action on Climate and Fragility Risks*.40.

⁴² "The History of Natural Disasters in Haiti."

⁴³ Robine *et al.*, "Death Toll Exceeded 70,000 in Europe During the Summer of 2003."

⁴⁴ Mitchell *et al.*, "Attributing Human Mortality During Extreme Heat Waves to Anthropogenic Climate Change."

⁴⁵ "Press Release: 2018: Extreme Weather Events Affected 60 Million People ."

⁴⁶ Internal Displacement Monitoring Centre, "Global Report on Internal Displacement: Summary 2019."9.

⁴⁷ UNESCO World Water Assessment Programme, "Leaving No One Behind."35.

⁴⁸ *ibid.*1.

and the Sahel region have been particularly hard hit by climate change, with half of the population in the Sahel experiencing a 0.5 to 1.0°C mean temperature increase since 1970.⁴⁹ This temperature increase, along with the greater rainfall variability, has had a particularly negative effect on natural resources in turn leading to food and water insecurity, and putting 6.9 million of the 13 million people living in the Lake Chad Basin alone in the category of “severely food insecure.”⁵⁰ Livelihood is also directly affected by this variability especially if they are dependent on natural resources such as through farming or pastoralism.

Food insecurity can result not only from local climate change effects but also from those effects felt elsewhere, particularly in today’s interconnected world economy. The Middle East and North Africa (MENA) rely on food imports for more than 30 percent of their calories consumed, and are therefore “highly vulnerable to global food price shocks.”⁵¹ In the MENA countries, wheat accounts for more than half of these calories, with Egypt being the world’s largest wheat importer spending about 3 percent on its GDP on wheat imports. In 2010-2011, a once-in-a-century drought in China—along with droughts and heat waves in Russia and Ukraine—lead to a global wheat shortage and doubling of its price which significantly impacted Egypt’s food supply causing a skyrocketing of bread prices and “protests that focussed on poverty, bread, and political discontent.”⁵²

⁴⁹ United Nations Environment Programme, *Livelihood Security: Climate Change, Conflict and Migration in the Sahel*.8.

⁵⁰ Nagarajan, Pohl, Ruttinger, Sylvestre, Vivekananda, Wall, and Wolfmaier, “Climate-Fragility Profile: Lake Chad.”015.

⁵¹ National Research Council, “Climate and Social Stress: Implications for Security Analysis.”77.

⁵² Femia and Werrell, *The Arab Spring and Climate Change*.7.

The impact of climate change on human security is most particularly pronounced among the poor who have the least resilience to the variability and the extremes, and can have the least ability to move or migrate in response to it. As shown in Figure 3, low and lower-middle income countries suffered a disproportionately high number of disaster deaths, experiencing 43% of all major recorded disasters in the past 20 years but 68% of the fatalities.⁵³ Additionally, Figure 4 shows this vulnerability can be inversely correlated with mobility, “leading to those being most exposed and vulnerable...having the least capability to migrate,”⁵⁴ and when they do migrate it is “an emergency response that creates conditions of debt and increased vulnerability, rather than reducing them.”⁵⁵ Even in a high income nation, the “economically disadvantaged population were displaced in the immediate aftermath [of Hurricane Katrina in New Orleans] and most have not returned... and African American residents returned more slowly, because they had suffered greater housing damage.”⁵⁶

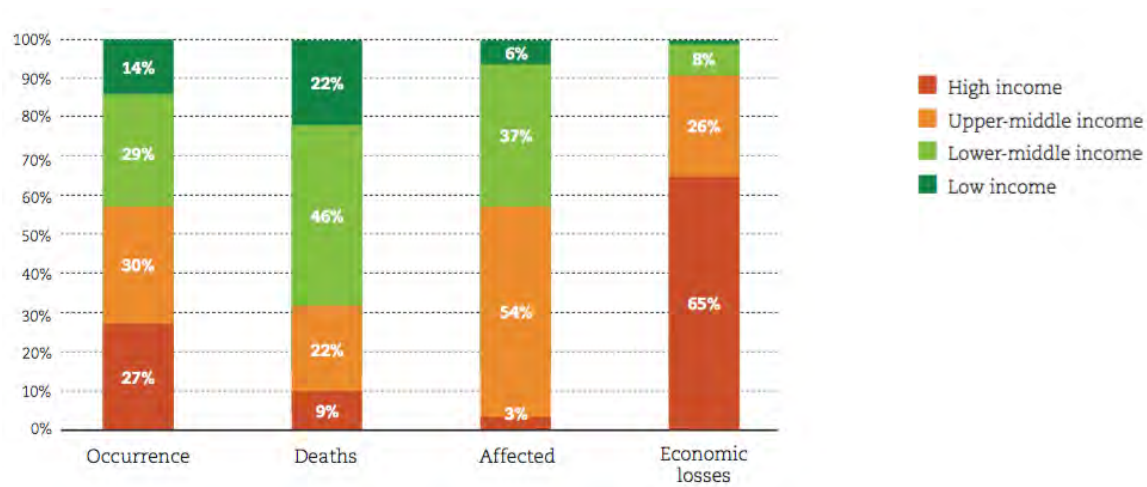


Figure 3—Climate-related and Geophysical Disasters 1998-2017.

⁵³ “Economic Losses, Poverty & Disasters 1998-2017.”

⁵⁴ Adger, Pulhin, Barnett, Dabelko, Hovelsrud, Levy, Spring, and Vogel, “2014 Human Security.”767.

⁵⁵ *ibid.*767.

⁵⁶ Myers *et al.*, 2008; Mutter, 2010; and Fussell *et al.* 2010 cited in: *ibid.*767.

Source: Centre for Research on the Epidemiology of Disasters - CRED, “Economic Losses, Poverty & Disasters 1998-2017”

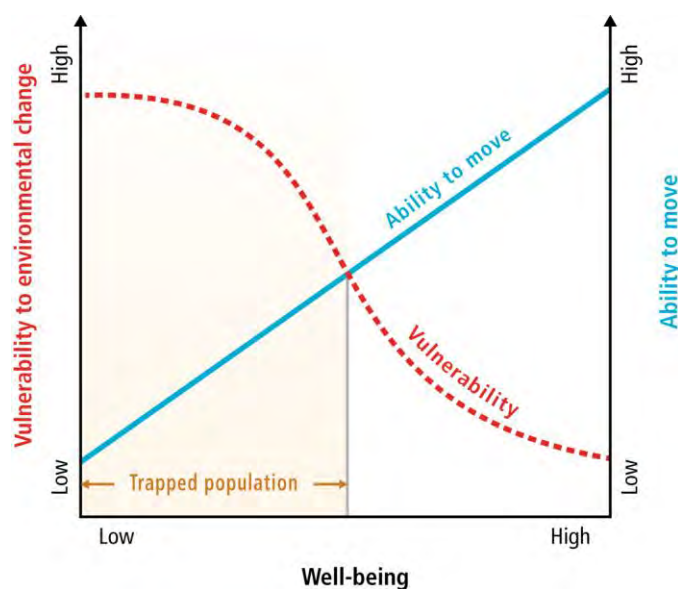


Figure 4— Relationship between vulnerability to environmental change and mobility showing that populations most exposed and vulnerable to the impacts of climate change may have least ability to migrate.

Source: Adger, Pulhin, Barnett, Dabelko, Hovelsrud, Levy, Spring, and Vogel, “2014 Human Security.”

Coping and Security—Threats from uncoordinated coping

It is in these responses to the human security issues that we begin to see how climate change can become a contributing factor in armed violence and intrastate—if not interstate—conflict. An economically diverse nation with an effective government can build resilience into its society to minimize the impact of natural disasters resulting from more frequent and extreme climatic events. Conversely, the greatest harm from these events will be felt in

low- and middle-income countries characterized by high levels of corruption and weak institutions and governance...[where]...conflict

and political or ethnic strife is present or has recently been present, [and there is an] inequitable allocation of public resources.⁵⁷

One place we see examples of this convergence of conditions is in Sub-Saharan Africa, especially in the Lake Chad Basin—encompassing portions of Cameroon, Chad, Niger, and Nigeria—where the United Nations Security Council recognized “the adverse effects of climate change and ecological changes among other factors on the stability of the region.”⁵⁸ This is a region with low levels of education and national integration, high levels of poverty, historical government neglect and marginalization from the periods of military rule and corruption. Climate change becomes a ‘threat multiplier’ interacting within “a complex dynamic [where] a number of national military, armed opposition groups and vigilante groups are all operating.”⁵⁹ This interaction compounds existing risks and pressures. Individuals—particularly young men—suffering from social and economic inequity are susceptible to recruitment by armed groups like Boko Haram to improve their social and economic status.⁶⁰ Boko Haram was responsible for almost 800 incidents in 2016 alone, which saw the “massive destruction of basic infrastructure, health and educational facilities commercial buildings, private houses and agricultural assets.”⁶¹ The violence between them and other armed groups, and government security forces—who themselves are responsible for approximately half of all reported deaths—

⁵⁷ National Research Council, “Climate and Social Stress: Implications for Security Analysis.”⁹².

⁵⁸ United Nations Security Council, *Resolution 2349 (2017)*.7.

⁵⁹ Nagarajan, Pohl, Ruttinger, Sylvestre, Vivekananda, Wall, and Wolfmaier, “Climate-Fragility Profile: Lake Chad.”V.

⁶⁰ *ibid.*25.

⁶¹ United Nations, “Impacts of Climate Change Go Well Beyond ‘the Strictly Environmental’, Deputy Secretary-General Tells Security Council Debate | Meetings Coverage and Press Releases.”

have displaced 2.5 million⁶² and increased pressure between the huge number of displaced persons and their host populations. In addition to this type of violence, tensions between farmers and pastoralists over arable land, grazing areas, and water have also now led to conflict and murder.⁶³ Weak, corrupt, and dysfunctional governments and public institutions—in whom the populations have very low levels of trust—have little interest or ability to curb or correct these issues and violence, which in turn stokes the “vicious circle of increasing vulnerability and fragility.”⁶⁴ The potential for widespread fragility is especially troubling when we consider that “by 2018, half of the world’s poor will live in states identified as fragile by the OECD.”⁶⁵ This can be seen graphically in Figure 5, where political fragility is mapped against nations most adversely affected by climate change.

⁶² Nagarajan, Pohl, Ruttinger, Sylvestre, Vivekananda, Wall, and Wolfmaier, “Climate-Fragility Profile: Lake Chad.”015.

⁶³ The Economist, “Disputes Over Water Will Be an Increasing Source of International Tension.”

⁶⁴ Nagarajan, Pohl, Ruttinger, Sylvestre, Vivekananda, Wall, and Wolfmaier, “Climate-Fragility Profile: Lake Chad.”V.

⁶⁵ Ruttinger et al., *A New Climate for Peace: Taking Action on Climate and Fragility Risks*.7.

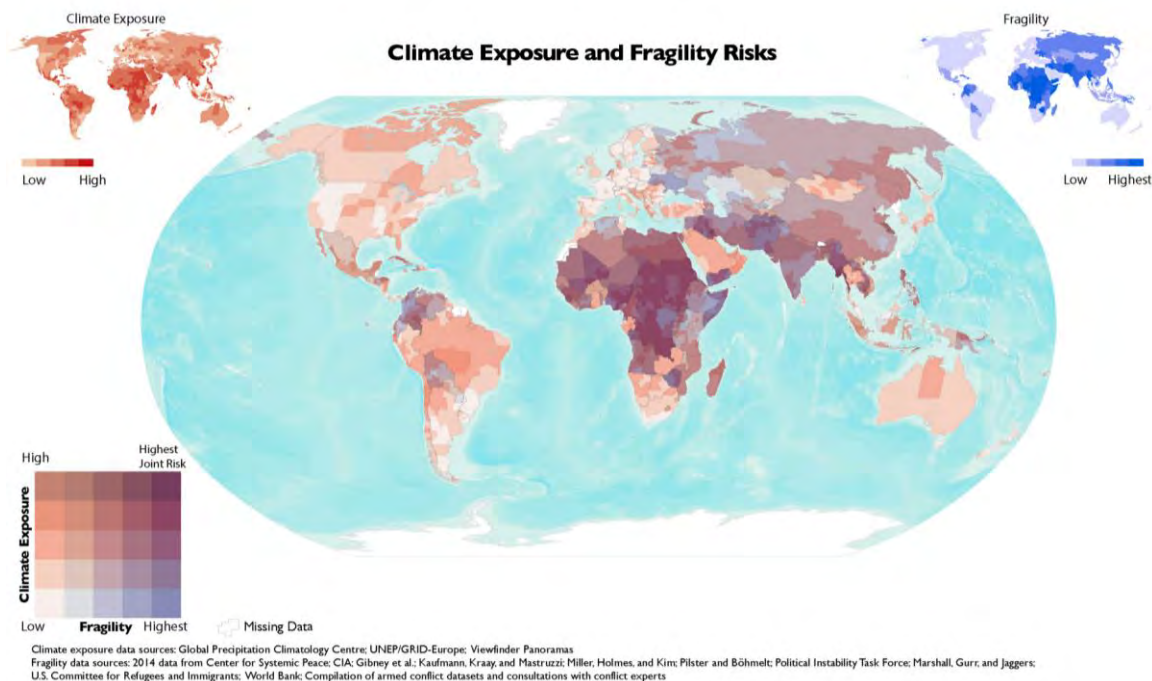


Figure 5--Composite map overlaying climate exposure and political fragility.
 Source: Moran et al., “Policy Summary: the Nexus of Fragility and Climate Risks”⁶⁶

Syria is another example of where the “complex interplay of variables, including climate change, natural-resource mismanagement, and demographic dynamics”⁶⁷ has led to the loss of livelihood, migration, and civil unrest. The climate change-induced devastating droughts in the 2000’s, and the mismanagement and neglect by the Assad regime of Syria’s natural resources lead to its total water resources being reduced by half between 2002 and 2008, and desertification of much of its farmland.⁶⁸ The impact of this was particularly felt by rural communities that saw significant migration to the urban centres, which in turn increased the strain on these already economically depressed areas with their own water-infrastructure deficiencies. By the time of the above noted global food price shocks of 2011, an estimated one million Syrians were already “extremely

⁶⁶ Moran et al., “Policy Summary: the Nexus of Fragility and Climate Risks.”

⁶⁷ Femia and Werrell, *The Arab Spring and Climate Change*.25.

⁶⁸ Werz and Hoffman in *ibid*.35.

food insecure” with an estimated two to three million in extreme poverty.⁶⁹ Researchers caution that direct causality is extremely difficult to study and prove—particularly in Syria given its continued instability—but that the “consequences of climate changes are stressors that can ignite a volatile mix of underlying causes that erupt into revolution.”⁷⁰ These were the conditions in the farming town of Dara’a which was a focal point for the early protests in 2011, with similar disaffected rural communities forming a prominent role in the Syrian opposition movement.⁷¹

International Conflict—Threats to international cooperation in managing shared resources

More than simply being a stressor in an already stressed environment, one extreme on the environmental security spectrum is nations going to war over climate-induced resource scarcity. Or as the Secretary General’s report states: “there may be implications for international cooperation from climate change’s impact on shared or undemarcated international resources.”⁷² One of the most commonly cited shared resource that is becoming scarcer with climate change is, of course, water. However, this idea of *Water Wars* has been around long enough that it has become a “cliché of doom-mongering” and faces its own “skeptical backlash.”⁷³ Indeed, analysts⁷⁴ are showing how transnational water sources can actually be the source of cooperation between nations that

⁶⁹ United Nations 2011 Global Assessment Report on Disaster Risk Reduction cited in *ibid.*25.

⁷⁰ *ibid.*1

⁷¹ *ibid.*27.

⁷² United Nations Secretary-General, *Climate Change and Its Possible Security Implications: Report of the Secretary-General, a/64/350.1.*

⁷³ The Economist, “Disputes Over Water Will Be an Increasing Source of International Tension.”

⁷⁴ For example: Adger, Pulhin, Barnett, Dabelko, Hovelsrud, Levy, Spring, and Vogel, “2014 Human Security;” Defence Intelligence Agency, “Global Water Security;” Gleick and Iceland, *Water, Security, and Conflict.*

may otherwise be uncooperative—such as the Indus River Commission surviving two major wars between Pakistan and India—and that “historically, water tensions have led to more water-sharing agreements than violent conflicts.”⁷⁵ But they still caution that the “most dangerous situation to monitor for is a combination of state fragility...and high water stress,”⁷⁶ especially in the current high-risk catchment basins in North and sub-Saharan African.⁷⁷

Similarly, with global warming allowing increased access to the Arctic and its wealth of ‘undemarcated’ resources, potential conflicts could ensue, especially given the overlapping and competing claims to the sea floor by some Arctic nations. Again, however, given the cooperative nature of negotiations, and the adherence to international law to settle disputes between erstwhile rivals,⁷⁸ the potential for conflict over newfound Arctic resources also appears unlikely. Although international conflict is one possible linkage between climate change and security, there appears to be a common consensus that “increased rivalry [over shared resources] is unlikely to lead directly to warfare between states,”⁷⁹ but “the possibility of [the] linkage cannot be ignored.”⁸⁰

⁷⁵ Defence Intelligence Agency, “Global Water Security.”3.

⁷⁶ National Research Council, “Himalayan Glaciers: Climate Change, Water Resources, and Water Security.”5.

⁷⁷ De Stefano et al., “Climate Change and the Institutional Resilience of International River Basins.”

⁷⁸ See for example: Rand, “The Arctic: a Tale of Two Russias. Global Vortex Essay;” Staun, “Russia’s Strategy in the Arctic: Cooperation, Not Confrontation;” Pezard et al., *Maintaining Arctic Cooperation with Russia*.

⁷⁹ Adger, Pulhin, Barnett, Dabelko, Hovelsrud, Levy, Spring, and Vogel, “2014 Human Security.”772. See also: Barnett, “Environmental Security;” Defence Intelligence Agency, “Global Water Security;” Dalby, Scott, Dasilva, and Suen, “Canada in a Climate Disrupted World.”

⁸⁰ Dalby, Scott, Dasilva, and Suen, “Canada in a Climate Disrupted World.”iv.

CONCLUSION

Climate change poses an existential threat to security. Extreme weather events such as hurricanes, flooding, and droughts have increased in both severity and frequency and have impacted human security and well-being through injury and loss of life, destruction of infrastructure, and forced displacement and migration. The poor of the world feel these impacts disproportionately, though the rich are not immune. Global warming has also caused water scarcity, and desertification of formerly arable land, leading to competition for natural resources, loss of livelihood, forced migration. When these impacts occur in fragile nations with weak governance, unequal distribution of wealth, and underlying social strife, they act as a threat multiplier, increasing stress in an already stressed system and can lead to armed violence and internal conflict. Analysts, nations, and international organizations are recognizing that “climate change has emerged as a security challenge that knows no borders, [which] will likely continue to generate humanitarian crises... [and] aggravate existing vulnerabilities.”⁸¹ With climate change and global warming predicted to continue unabated, this is a threat and challenge that is not going away.

⁸¹ Canada. Department of National Defence, *Strong, Secure, Engaged. Canada's Defence Policy*.

BIBLIOGRAPHY

- Adger, W N, J M Pulhin, Jon Barnett, G D Dabelko, G K Hovelsrud, M Levy, U Oswald Spring, and C H Vogel. "2014 Human Security." In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part a Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by C B Field, V R Barros, D J Dokken, K J Mach, M D Mastrandrea, T E Bilir, M Chatterjee, K L Ebi, Y O Estrada, et al., 755–91, Cambridge UK, and New York USA: Cambridge University Press, 2014.
- Barnett, Jon. "Environmental Security." In *Contemporary Security Studies*, edited by Alan Collins, 190–207, New York: Oxford University Press, 2013.
- Canada. Department of National Defence. *Strong, Secure, Engaged. Canada's Defence Policy.*, Ottawa: DND Canada, 2017.
- Dalby, Simon, Daniel Scott, Clay Dasilva, and Alex Suen. "Canada in a Climate Disrupted World." *Geography and Environmental Studies at Scholars Commons Laurier* 12 (2017).
- De Stefano, Lucia, James Duncan, Shlomi Dinar, Kerstin Stahl, Kenneth M Strzepek, and Aaron T Wolf. "Climate Change and the Institutional Resilience of International River Basins." *Journal of Peace Research* 49, no. 1 (January 31, 2012): 193–209. doi:10.1177/0022343311427416.
- Defence Intelligence Agency. "Global Water Security." *Intelligence Community Assessment*, Washington DC, February 7, 2012.
- Deudney, Daniel. "The Case Against Linking Environmental Degradation and National Security." *Millennium Journal of International Studies* 19, no. 3 (1990): 461–76.
- Elliott, Lorraine. "Human Security/Environmental Security." *Contemporary Politics* 0, no. 1 (January 12, 2015): 1–14. doi:10.1080/13569775.2014.993905.
- Emmers, Ralf. "Securitization." In *Contemporary Security Studies*, edited by Alan Collins, 131–44, New York, 2013.
- The Arab Spring and Climate Change*. Edited by Francesco Femia and Caitlin E Werrell, The Center for Climate and Security, 2013.
- Gleick, Peter, and Charles Iceland. *Water, Security, and Conflict*, Washington DC: World Resources Institute, 2018.
- Intergovernmental Panel on Climate Change. "2013 Summary for Policymakers." In *Climate Change the Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, edited

by T F Stocker, D Qin, G K Plattner, M Tignor, S K Allen, J Boschung, A Nauels, Y Xia, V Bex, and P M Midgley, 1–28, Cambridge and New York, 2013.

- “2014 Summary for Policymakers.” In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part a Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by C B Field, V R Barros, D J Dokken, K J Mach, M D Mastrandrea, T E Bilir, M Chatterjee, et al., 1–34, Cambridge University Press, 2014.

Internal Displacement Monitoring Centre. “Global Report on Internal Displacement: Summary 2019,” Norwegian Refugee Council, May 7, 2019.

Knutson, Thomas R, Joseph J Sirutis, Gabriel A Vecchi, Stephen Garner, Ming Zhao, Hyeong-Seog Kim, Morris Bender, Robert E Tuleya, Isaac M Held, and Gabriele Villarini. “Dynamical Downscaling Projections of Twenty-First-Century Atlantic Hurricane Activity: CMIP3 and CMIP5 Model-Based Scenarios.” *Journal of Climate* 26, no. 17 (September 2013): 6591–6617. doi:10.1175/JCLI-D-12-00539.1.

Krampe, Florian, and Vane Moraa Aminga. “The Need for an African Union Special Envoy for Climate Change and Security.” *Stockholm International Peace Research Institute*, February 7, 2019. doi:10.1093/isr/vix043.

Mathews, Jessica Tuchman. “Redefining Security.” *Foreign Affairs* 68, no. 2 (1989): 1–16.

Mitchell, Daniel, Clare Heaviside, Sotiris Vardoulakis, Chris Huntingford, Giacomo Masato, Benoit P Guillod, Peter Frumhoff, Andy Bowery, David Wallom, and Myles Allen. “Attributing Human Mortality During Extreme Heat Waves to Anthropogenic Climate Change.” *Environmental Research Letters* 11, no. 7 (July 8, 2016): 074006–9. doi:10.1088/1748-9326/11/7/074006.

Mogherini, Federica. “Mogherini at the High-Level Event ‘Climate, Peace and Security: the Time for Action’.” presented at the Climate, peace and security the time for action, June 22, 2018.

Moore, Scott, and Michelle Melton. “China's Pivot on Climate Change and National Security.” *The Lawfare Institute in Cooperation with Brookings Institute*, April 2, 2019. <https://www.lawfareblog.com/chinas-pivot-climate-change-and-national-security>.

Moran, Ashley, Joshua W Busby, Clionadh Raleigh, Todd G Smith, Roudabeh Kishi, Nisha Krishnan, and Charles Wight. “Policy Summary: the Nexus of Fragility and Climate Risks.” *United States Agency for International Development*, Washington, February 11, 2019. https://pdf.usaid.gov/pdf_docs/PA00TKRR.pdf.

Nagarajan, Chitra, Benjamin Pohl, Lukas Ruttinger, Florence Sylvestre, Janani

- Vivekananda, Martin Wall, and Susanne Wolfmaier. “Climate-Fragility Profile: Lake Chad,” Berlin: adelphi, May 4, 2018.
- Najibi, Nasser, and Naresh Devineni. “Recent Trends in the Frequency and Duration of Global Floods.” *Earth System Dynamics* 9, no. 2 (2018): 757–83. doi:10.5194/esd-9-757-2018.
- National Research Council. “Climate and Social Stress: Implications for Security Analysis.” Edited by J D Steinbruner, P C Stern, and J L Husbands. *Committee on Assessing the Impacts of Climate Change on Social and Political Stresses*, Washington DC: National Academies Press, 2013. doi:10.17226/14682.
- . “Himalayan Glaciers: Climate Change, Water Resources, and Water Security.” *Committee on Himalayan Glaciers, Hydrology, Climate Change, and Implications for Water Security*, Washington: National Academies Press, December 31, 2012. http://www.nap.edu/catalog.php?record_id=13449.
- Naumann, G, L Alfieri, K Wyser, L Mentaschi, R A Betts, H Carrao, J Spinoni, J Vogt, and L Feyen. “Global Changes in Drought Conditions Under Different Levels of Warming.” *Geophysical Research Letters* 45, no. 7 (April 2, 2018): 3285–96. doi:10.1002/2017GL076521.
- Pezard, Stephanie, Abbie Tingstad, Kristin Van Abel, and Scott Stephenson. *Maintaining Arctic Cooperation with Russia*, Santa Monica: RAND Corporation, 2017.
- Rand, Duncan. “The Arctic: a Tale of Two Russias. Global Vortex Essay.” In *Joint Command and Staff Programme Distance Learning*, 1–25, Toronto, 2019.
- Robine, Jean-Marie, Siu Lan K Cheung, Sophie Le Roy, Herman Van Oyen, Clare Griffiths, Jean-Pierre Michel, and François Richard Herrmann. “Death Toll Exceeded 70,000 in Europe During the Summer of 2003.” *Comptes Rendus Biologies* 331, no. 2 (February 2008): 171–78. doi:10.1016/j.crv.2007.12.001.
- Ruttinger, Lukas, Dan Smith, Gerald Stang, Dennis Tanzler, Janani Vivekananda, Oli Brown, Alexander Carius, et al. *A New Climate for Peace: Taking Action on Climate and Fragility Risks*. Edited by Meaghan Parker, An independent report commissioned by the G7 members, 2015. <https://www.newclimateforpeace.org/>.
- Staun, Jørgen. “Russia's Strategy in the Arctic: Cooperation, Not Confrontation.” *Polar Record* 53, no. 3 (May 8, 2017): 314–32. doi:10.1017/S0032247417000158.
- The Economist. “Disputes Over Water Will Be an Increasing Source of International Tension.” *The Economist*, February 28, 2019. <https://www.economist.com/special-report/2019/02/28/disputes-over-water-will-be-an-increasing-source-of-international-tension>.

UNESCO World Water Assessment Programme. “Leaving No One Behind.” *The United Nations World Water Development Report*, Paris, March 5, 2019.

United Nations. “Impacts of Climate Change Go Well Beyond ‘the Strictly Environmental’, Deputy Secretary-General Tells Security Council Debate | Meetings Coverage and Press Releases.” *United Nations*, July 11, 2018. <https://www.un.org/press/en/2018/dsgsm1195.doc.htm>.

United Nations Development Programme. “New Dimensions of Human Security.” In *Human Development Report 1994*, 22–46, New York, 1994.

United Nations Environment Programme. *Livelihood Security: Climate Change, Conflict and Migration in the Sahel*, United Nations Environment Programme, 2011. http://postconflict.unep.ch/publications/UNEP_Sahel_EN.pdf.

United Nations Secretary-General. *Climate Change and Its Possible Security Implications: Report of the Secretary-General, a/64/350*, United Nations, 2009. http://www.un.org/ga/search/view_doc.asp?symbol=A/64/350.

—. *Follow-Up to General Assembly Resolution 64/291 on Human Security: Report of the Secretary-General*, New York: United Nations, 2012.

United Nations Security Council. *Maintenance of International Peace and Security: Understanding and Addressing Climate-Related Security Risks*, New York: United Nations, 2018. <https://documents-dds-ny.un.org/doc/UNDOC/PRO/N18/219/13/pdf/N1821913.pdf?OpenElement>.

—. *Resolution 2349 (2017)*, New York: United Nations, 2017.

—. *Resolution 2408 (2018)*, New York: United Nations, 2018.

—. “Security Council Holds First-Ever Debate on Impact of Climate Change on Peace, Security, Hearing Over 50 Speakers | Meetings Coverage and Press Releases.” *United Nations*, New York, April 17, 2007. <https://www.un.org/press/en/2007/sc9000.doc.htm>.

—. “Security Council, in Statement, Says ‘Contextual Information’ on Possible Security Implications of Climate Change Important When Climate Impacts Drive Conflict.” *United Nations*, July 20, 2011. <https://www.un.org/press/en/2011/sc10332.doc.htm>.

Urban, Jessica LeAnn. *Nation, Immigration, and Environmental Security*, New York: Palgrave MacMillan, 2008.

“Economic Losses, Poverty & Disasters 1998-2017,” Brussels: Centre for Research on the Epidemiology of Disasters - CRED, October 2, 2018. <https://cred.be/sites/default/files/PressReleaseReview2018.pdf>.

- “G7 Communique on Climate and Security | UNFCCC.” *United Nations Framework Convention on Climate Change*, April 19, 2015. <https://unfccc.int/news/g7-communicue-on-climate-and-security>.
- “NATO - Topic: Environment – NATO's Stake.” *North Atlantic Treaty Organization*, December 9, 2014. https://www.nato.int/cps/en/natohq/topics_91048.htm.
- “Press Release: 2018: Extreme Weather Events Affected 60 Million People .” *Centre for Research on the Epidemiology of Disasters - CRED*, January 24, 2019. <https://www.cred.be/sites/default/files/Review2018.pdf>.
- “State of the Cryosphere: Sea Ice.” *National Snow and Ice Data Center*. Accessed December 18, 2018. https://nsidc.org/cryosphere/sotc/sea_ice.html.
- “The History of Natural Disasters in Haiti.” *University of Fondwa-USA*, February 22, 2018. <https://ufondwa.org/history-natural-disasters-haiti/>.