



THE CLIMATE AND  
**SECURITY**  
ADVISORY GROUP

CLIMATE AND SECURITY FELLOWSHIP PROGRAM  
**CLIMATE SECURITY RISK BRIEFERS**

OCTOBER 2021

THE CENTER FOR  
CLIMATE AND  
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# THE CLIMATE AND SECURITY ADVISORY GROUP

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OCTOBER 2021

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# INTRODUCTION

These are unprecedented times. The world continues to battle the COVID-19 pandemic, while democracies and economies around the globe are tested. Through it all, climate change is destabilizing natural and social systems, and driving new security risks. It has never been more important to engage the next generation of leaders on addressing these systemic risks.

The Climate and Security Advisory Group (CSAG), a project of the Center for Climate and Security, founded the Climate and Security Fellowship to do just that. The 2019-2020 Climate and Security Fellows are a distinguished group of professionals, all with one thing in common: a desire to address the security threats of climate change. They are emerging leaders in their respective fields of study and bring the necessary diversity of perspectives and backgrounds to address such wicked problems.

A self-selected group of Fellows wrote briefers on emerging climate security vulnerabilities. Each chose a topic that they felt was underrepresented in the current literature and deserved further examination. Our hope is that these briefers will spark a broader conversation on these vital security concerns.

I want to thank the Climate and Security Advisory Group for their support and thank all of the climate and security experts who briefed this cadre of fellows including: Hon. Sharon Burke, Hon. John Conger, Col. Mike Gremillion, USAF, Hon. Sherri Goodman, Dr. Rod Schoonover, and Joan VanDervort. Congratulations to the 2019-2020 class of Fellows. We look forward to watching their careers progress, and to their guidance of the next generation of leaders!

**Esther Sperling**

**Co-Founder and Program Director, CSAG Climate and Security Fellowship Program**

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# CSAG FELLOWSHIP PROGRAM FELLOWS

## 2019-2020

### COLE BAKER

Cole A. Baker is a current congressional staffer and a 2019 security and defense fellow at Young Professionals in Foreign Policy. He has worked previously as a freelance contractor writing on terrorism and human trafficking and as a violent extremism fellow for the United Nations in Turkey. Baker holds an MA in Nonproliferation and Terrorism Studies from the Middlebury Institute of International Studies and a BA in Philosophy and Political Science from Middlebury College.

### JAMES BARILE

James Barile has led briefings to senior officials of the U.S. Department of Defense, Department of State, and Environmental Protection Agency as a civilian, most recently leading predictive research on aridification and terrorism for a Special Operations Force command. At Columbia Law School, Mr. Barile served as a research assistant at the Sabin Center for Climate Change Law in 2017. At Yale College, as a two-sport varsity athlete, he authored an algorithm to model solar production capability en masse on National Renewable Energy Laboratory software in 2014, then forged a co-op partnership with SolarCity in 2016 and led solar installations in two states. Mr. Barile is proficient in Chinese and Persian.

### ANNALISE BLUM

Annalise Blum is a AAAS Science & Technology Policy Fellow supporting Stabilization and Peace Operations in the Office of the Under Secretary for Defense-Policy (OSD-P) at the Department of Defense. At OSD-P, Annalise contributes to interagency efforts to promote stabilization in fragile countries, including through implementation of the Stabilization Assistance Review. Previously, she was a visiting fellow with the American Meteorological Society's Policy Program and postdoctoral fellow in Earth and Planetary Sciences at Johns Hopkins University. With a background in water resources engineering, Annalise has studied floods, droughts, access to safe drinking water, and communication of hydrologic forecasts in the US and abroad. Annalise also served as a Mirzayan Fellow in Policy and Global Affairs at the National Academy of Sciences, an NSF fellow at the US Geological Survey, and a research assistant at the Center for International Development at the Harvard Kennedy School of Government. Annalise has a PhD in environmental and water resources engineering from Tufts University, M.S. from UNC-Chapel Hill, and a B.S. from Stanford University.

## **OLIVIA BURZYNSKA-HERNANDEZ**

Olivia Burzynska-Hernandez is a consultant at C&M International where she advises multinational companies on issues related to digital trade, global environmental policy, and global health. Prior to joining C&M International, Olivia was the Program Officer for the RAISE Health Initiative, a major activity of the USAID-funded Evidence Project, which aimed to improve women's health services and education in global supply chains, particularly through changes in global and corporate policies and workplace practices. She was also previously with the Coalition of Services Industries (CSI), an international trade association. At CSI, she advocated for incorporating services language within international trade agreements, notably to reflect the use of digital trade across borders, and she organized Coalition delegations to the World Trade Organization (WTO). Olivia is the recipient of a Fulbright English Teaching Assistant Award, and subsequently taught English in Sabah, Malaysia. She holds a master's degree in international relations from the Elliott School of International Affairs at George Washington University and a bachelor's degree in international relations from the Robert D. Clark Honors College at the University of Oregon.

## **LYDIA CARDONA**

Lydia Cardona is the Manager for Conflict Resolution and Peace at Conservation International, managing the institution's environmental peacebuilding program within the Center for Communities and Conservation. She provides technical guidance on peacebuilding, conflict management, and gender and works directly with field teams to build capacity and integrate conflict sensitivity into their programs. She has trained over 100 staff on conflict analysis, communication, and facilitation while working globally across diverse cultures and languages. She has a professional interest in the nexus of climate change and conflict on conservation and adaptation efforts. Lydia has a master's degree in International Peace Studies from Trinity College Dublin, with a focus on women, peace and security, and a B.A. in International Affairs from the University of Georgia.

## **NAZ EL-KHATIB**

Naz El-Khatib is Special Assistant, Office of the Counselor U.S. Department of State. He was previously the Associate Director of Policy at National Security Action. He focuses on major issues in contemporary U.S. foreign policy, principally climate change, U.S.-China relations, and democracy and the rule of law. Naz previously worked at McKinsey in multiple roles, including as Deputy Chief of Staff to the Global Managing Partner. He has additional experience in law, local government, and asset management. Naz holds a J.D. from Stanford Law School, an M.Phil. in International Relations and Politics from Cambridge, and a B.A. in Political Science from Yale. He is an avid Steelers and Lakers fan, has lived in six U.S. states for at least two years, and grew up primarily in Pittsburgh, PA.

## **ALEXANDRA HACKBARTH**

Alexandra Hackbarth is Senior Policy Advisor at E3G, an international climate think-tank. Her work focuses on climate diplomacy and the geopolitics of climate change. Previously, she was the Director of Climate and Energy Security at the American Security Project, where she primarily focused on climate change and its role in strategic rivalry with China. From 2017 to 2019, Alexandra served as the Special Advisor for Forward Operations in the Special Inspector General for Afghanistan Reconstruction (SIGAR) office in Kabul, Afghanistan. Prior to her posting in Kabul, Alexandra was the Senate Congressional Liaison in SIGAR's Washington, D.C. office. Alexandra was also a Harold W. Rosenthal Fellow for International Relations in the Office of Stability and Humanitarian Affairs at the

Pentagon. During her time, she drafted a decision memo for the Under Secretary of Defense for Policy in support of a UN peacekeeping operation and authored a paper on the Defense Department's equities for peacekeeping missions.

Alexandra received a Masters in Public Administration and a Master of Arts in International Relations from the Maxwell School at Syracuse University. In the fall of 2014, Alexandra studied at Tsinghua University in Beijing, where her coursework focused on Chinese history and culture. Before graduate school, Alexandra was a Legislative Assistant for Senator Ron Wyden of Oregon. Her portfolio included natural resources, energy, agricultural, and transportation policy. Alexandra also has an advanced degree from the Air Command and Staff College, an academic course designed for field-grade military officers.

## **RYAN HAERER**

Ryan Haerer works at the intersection of climate change and energy, agriculture, fisheries, and security. He has significant professional expertise dealing with the opportunities and risks with developing cleaner traditional and alternative fuels. He recently founded Nexdevonian, a public benefit startup building low-cost, climate-beneficial greenhouse systems. He has an M.A. in international relations and economics from Johns Hopkins SAIS with a specialization in energy, resources, and environmental policy and plans to complete an M.A. at Johns Hopkins in global security studies in 2020. He is a veteran of the US Army and served as a combat medic in Iraq in 2005-06 with the 10th Mountain Division.

## **MATTHEW HALLEX**

Matthew Hallex is a Research Staff Member in the Joint Advanced Warfighting Division at the Institute for Defense Analyses (IDA.) His work at IDA focuses on long-term defense strategy, defense innovation, and the military implications of emerging technologies, particularly space and artificial intelligence. Matthew holds a graduate degree in Security Policy Studies from George Washington University. He received his undergraduate degree from Hunter College, City University of New York and studied at the Shanghai University of Finance and Economics.

## **DAVID HARARY**

David Harary is an Acquisition Program Analyst with OBXtek Inc. working for the Office of the Assistant Secretary of the Air Force for Acquisition, Technology, and Logistics at the Pentagon. In 2014, David founded the Center for Development and Strategy 501(c)(3). With family heritage from Aleppo, his passion for climate security started at the onset of the Syrian Civil War. He merged this passion with an interest in space technology by exploring the ways remote sensing satellites can be used to anticipate resource shortages and insecurity. David's writing on environmental security issues has been published in the Bulletin of the Atomic Scientists, Slate, The National Interest, and the Woodrow Wilson Center's New Security Beat. He holds an M.Sc. in Sustainability Management from the University of Toronto and a B.A. in Economics and Geography and International Trade from the State University of New York at Buffalo.

## RUDRA KAPILA

Dr. Kapila is the Co-Chair for the Climate Change Working Group at Women of Color Advancing Peace and Security (WCAPS), a non-profit organization committed to promoting diverse perspectives from WoC leaders within foreign policy and national security. She is also a multifaceted researcher and an expert on the development and implementation of clean energy technologies to mitigate the adverse impacts of climate change, specifically in the context of vulnerable emerging economies. Following her doctoral research on carbon capture utilization and storage (CCUS) technology, and her work on energy and environmental policies with the Scottish Parliament, Dr. Kapila applied her unique skillset to support political campaigns and policy outreach for U.S. presidential, congressional, and state-level races. She received her interdisciplinary Ph.D in Earth & Planetary Science and International Relations from the University of Edinburgh, Scotland.

## JESSICA LIBERTINI

Dr. Jessica M. Libertini, Ph.D., is currently an associate professor of applied mathematics at Virginia Military Institute where she also holds a Virginia Militia commission from the Governor of Virginia at the rank of Lieutenant Colonel. After graduating with her B.S. in Mechanical Engineering from Johns Hopkins University, Ms. Libertini began her professional career in 1999 as an engineer at General Dynamics, Electric Boat, where she worked on the VIRGINIA Class, the SSN 23, the SSBN to SSGN conversion, SUBMARINE NR-1, and DARPA-funded advanced concepts. In 2003, she was promoted to senior engineer and was selected to represent General Dynamics on the Missile Defense National Team where she was the architecture lead for defense of the homeland and also ran analyses that were sent to Congress, NATO, the Secretary of Defense, and the President of the United States. During her tenure with General Dynamics, Ms. Libertini completed masters' degrees in Mechanical Engineering from Rensselaer Polytechnic Institute and Applied Mathematics from Brown University. Upon completion of her Ph.D. in Applied Mathematics from Brown University in 2008, Dr. Libertini joined the faculty of the United States Military Academy at West Point where she went on to be awarded a Davies National Research Council Fellowship and the Army Commander's Award for Public Service. Prior to joining the Virginia Military Institute faculty in 2014, she served on the faculty at the University of Rhode Island where she brought in over \$1M in National Science Foundation funding for STEM education efforts. In 2017, she was selected as an AAAS Science & Technology Policy Fellow with a placement in the Office of the Secretary of Defense, Office of the Undersecretary of Defense for Acquisition and Sustainment, International Cooperation, where she managed a portfolio of eight partner nations and directly supported Undersecretary Ellen Lord in her international engagements.

## JOHN LICHTEFELD

John Lichtefeld is a Vice President at The Asia Group, where he provides strategic advisory and regulatory analysis for emerging frontier markets in Southeast Asia, as well as client support for foreign direct investment projects across the automotive, manufacturing, media, non-profit, telecommunications, and tourism sectors. In this capacity, he is responsible for tracking regional and sectoral trends, providing insight on political developments and impending regulatory reforms, and developing sophisticated investment and government relations strategies to help clients' investments achieve their full potential. John has extensive experience operating in Southeast Asia, and has lived and traveled throughout the region. Before joining The Asia Group, John worked as a Foreign Legal Consultant with the Singaporean law firm Kelvin Chia's Yangon office, working alongside other regional consultants and local attorneys. He was later seconded to Myanmar's largest telecommunications provider, KSGM, where he served as in-house counsel during the implementation of Myanmar's telecommunications law. While he was in Yangon, John

also traveled frequently to Bangkok to serve as an independent consultant to a USAID-backed development project focused on preparing the region's small-scale agricultural sectors for impending changes due to economic development and climate change. John has a Master of Arts in Security Policy Studies from the Elliott School of International Affairs at the George Washington University, a J.D. from Georgetown Law, and a Bachelor of Arts in Political Science from Johns Hopkins University. He is also a Nonresident Fellow with the Stimson Center's Southeast Asia program.

## **ANDREW LIGHT**

Andrew Light is a Project Manager at the Solar Foundation. He holds a Master's in Environmental Policy, Education, and Communication. During his graduate work he studied how shared natural resources can be leveraged to help build the foundation for peace in transboundary environmental conflicts. As a student, Andrew also worked as a Policy Analyst for the Graham Sustainability Institute at the University of Michigan, where he researched the process of wind and solar energy development in the State of Michigan. Prior to graduate school, Andrew earned a BA in International Relations from Grand Valley State University.

## **RENNIE MEYERS**

Rennie Meyers is a Physical Scientist at the National Science Foundation. She was previously a SeaGrant Marine Policy Fellow supporting the Subcommittee on Coast Guard and Maritime Transportation in the House Committee on Transportation and Infrastructure. She advised the Subcommittee on matters related to coastal resilience, climate change impacts and adaptation, natural resource management, and sustainable maritime industry issues as they pertain to agencies like the Coast Guard and Maritime Administration. Previously, she received a Watson Fellowship to independently research coral restoration and artificial reef development in the South China Sea, exploring the interaction between geopolitics, security, nature-based infrastructure, and climate change adaptation. Rennie received a BA in Environmental Studies and History from Reed College, and a MA in Marine Affairs from University of Rhode Island specializing in coastal zone management and policy.

## **ZANDER NASSIKAS**

Alexander (Zander) Nassikas is an Associate at the United Nations Climate Action Team. He has a masters from Yale University's Jackson Institute for Global Affairs where he focused on the geopolitical consequences of global climate change. He was selected to be a fellow last year for former Secretary of State John Kerry. Prior to graduate school, Zander worked at the Woods Hole Research Center, a climate change think tank in Massachusetts. He was a research assistant to Dr. Richard Houghton. Together they studied the impact of land management on the global carbon cycle, publishing several peer-reviewed articles. Zander has a BA in Neuroscience and Behavior from Wesleyan University.

## **JOE RECHT**

Joe Recht is an Analyst at the U.S. Government Accountability Office, currently on the Strategic Issues team. He is experienced in government efficiency and oversight, national security, and the energy sector. He previously served the Senate Homeland Security and Governmental Affairs Committee as a law clerk equivalent, the Departments of State and Defense as a management consultant with Deloitte, and the Department of Energy's Energy Security Division

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## **EMILY SAMPLE**

Emily Sample is a PhD Candidate at George Mason University School for Conflict Analysis and Resolution, where she is the Executive Director of the Raphaël Lemkin Genocide Prevention Program. Previously, she has worked as Associate Director of Education at Holocaust Museum Houston and for the International Conference on the Great Lakes Region Ugandan National Committee on the Prevention and Punishment of Genocide and Mass Atrocities, as well as the U.S. Holocaust Memorial Museum. She earned her B.A. from The College of William and Mary and her M.A. in Human Rights and Genocide Studies from Kingston University London. Her research interests include sexual- and gender-based violence, climate change mitigation, and mass atrocity prevention.

## **MINI SARASWATI**

Mini Saraswati has a PhD Candidate in Political Science at The Ohio State University where she specializes in Comparative Politics and Political Economy. She also earned an MA in Climate and Society from Columbia University (2013) and completed a BA in Political Science, with a minor in Astronomy, at Wellesley College (2010). Her doctoral work examines the links between climate volatility and political violence in sub-Saharan Africa; with a particular focus on how small-holder farmers across the region seek out the protection and assurance of social groups—especially armed groups—in order to reduce the psychological and economic burden of climate-linked economic uncertainty. Her other research interests include social policy and the role of risk inequality in driving political violence, as well as transnational security challenges emanating from fragile and failed states. Over the course of her career, she has conducted fieldwork in Uganda, Mongolia, and India and has worked with organizations such as the Red Cross and the Earth Institute on climate change issues.

## **ANGELA SORIANO-QUEVEDO**

Angela is an international consultant with a strong interest in how climate change could drive instability or conflict in specific contexts, as well as the way that it could influence the expansion of extremist groups. Currently, she is an expert reviewer for the IPCC's Working Group II, which assesses the impacts, adaptation and vulnerabilities related to climate change, contribution to the IPCC Sixth Assessment Report. Previously, Angela worked as a consultant for the World Bank's Climate Change Group where she contributed to the Bank's Climate Change Adaptation and Resilience Action Plan, and worked on other initiatives related to climate services for decision-making and disaster risk management in fragile contexts. She also worked for INTERPOL's Environmental Security Program. Angela earned her Masters of Arts in Climate and Society from Columbia University.

## **RABIOU YARI**

Rabiou I. Yari is a naturalized United States citizen from Niger republic, West Africa. He lives in Maryland with his wife and three kids (two girls and a boy). In May of 2019, he graduated from American University in Washington, DC with a Master of Science in Justice, Law and Criminology with concentration in Terrorism and Security Policy. In December 2009, he was awarded a full fellowship by the U.S. Department of Defense to attend Georgetown University in Washington, DC as a National Security Scholar. There, he received analytical tradecraft training in research methodology, database management and geopolitical trends analysis. Prior to that, in 2008, he graduated from Fort Schuyler, State University of New York Maritime College with a Master of Science degree in International Transportation Management. Before attending Maritime college, he attended Hofstra University, in Long Island, New York where he earned a B.A in Political Science (International Relations) in 2006. From 2006 to 2008, he worked as Contracts Management Assistant with the Contracts Division of New York City Transit Authority supporting operations managers with financial management responsibilities. In 1998, he earned an L.L.B in Business Law (Honors) from the Private Professional Institute in Niamey, Niger, where he worked as legal counsel for two years. Before that, he attended the prestigious Ecole National d'Administration (E.N.A) in Niamey and graduated with a professional degree in Law and Judiciary Science. Since 2010, he has been working as Consultant providing research and analysis services for various institutions in Washington, DC. He is a PhD candidate in International Relations and Diplomacy at the Center for Diplomatic and Strategic Studies in Paris.



Grand Ethiopian Renaissance dam, Ethiopia, July 2016. (Water Alternatives/Flickr)

# The Evolution of Environmental Terrorism: From Tactical Ploy to Strategic Consideration

Cole Baker

As human populations rise and climate change alters global and regional climate patterns, environmental terrorism—defined as the deliberate destruction, exploitation, or modification of natural resources<sup>1</sup>—may increasingly become the face of modern conflict. Water, food, energy, and clean air are all resources that are fundamental to a healthy society. As these resources are put under increased pressure, they are ripe for exploitation and weaponization.

While environmental terrorism has historically been used on the tactical and operational levels, climate change and other pressures on natural resources are drastically increasing the effectiveness of this type of conflict. Considering the increasing importance of natural resources in the face of volatile climate patterns, the evolution of environmental terrorism into a strategic-level concern will be evident both in inter-state competition and in conflict with non-state armed groups. As a world leader, the United States must start planning for this eventuality now.

## DEFINING ENVIRONMENTAL TERRORISM

Defining the concept of terrorism is a contentious endeavor. Numerous definitions exist, and the debate as to the best definition is highly contested among policy makers and academics, with even the U.S. government having multiple definitions of the term.<sup>2</sup> Environmental terrorism also lacks a clear authoritative definition,<sup>3</sup> which is exacerbated by how it is used interchangeably with environmental warfare or ecoterrorism.<sup>4</sup>

For the purposes of this article, environmental terrorism can be understood as unlawful actions that intentionally harm, destroy, or deprive access to natural resources in order to control, influence, and/or coerce other states, groups, or individuals. Under this definition, environmental terrorism can be a means of resource deprivation as well as a means of weapons delivery; water systems can be targeted to prevent water from getting to a vulnerable population or hijacked to poison the water being delivered.

Under the Environmental Modification Convention (ENMOD) any hostile use of environmental modification techniques that have “widespread, long-lasting or severe effects” violates international law.<sup>5</sup> The provisions of the Additional Protocol I of 1977 to the Geneva Conventions of 1949 complement the ENMOD Convention, as they directly prohibit damage to the environment during armed conflict.<sup>6</sup>

While there is ambiguity in these statutes, any large-scale targeting of a natural resource in the context of conflict is potentially an unlawful act. However, that classification has done little to prevent this phenomenon.

## DEFINING THE LEVELS OF WAR

Environmental terrorism is not new. It appears as recently as the Syrian conflict—with both the Assad government and non-state actors targeting springs<sup>7</sup> and dams<sup>8</sup> to control and weaponize water and electricity<sup>9</sup>—and extends back throughout much of documented history.<sup>10</sup> This is understandable, as controlling resources allows one to control their enemy. However, environmental warfare has generally been a tactic of conflict, rather than a key component of strategy.

Modern military theory delineates and draws connections across strategy, operations, and tactics.<sup>11</sup> Understanding environmental terrorism requires briefly noting these distinctions.

Strategy occupies the top tier of this system, focusing on overarching objectives and the impairment of an adversary’s ability to continue hostilities. Strategy specifically identifies centers of gravity (COG), which are a “source of power that provides moral or physical strength, freedom of action, or will to act,”<sup>12</sup> in order to either protect or neutralize them in the course of a conflict. Put simply, strategy is concerned with what leads to conflict and with what nations fight.<sup>13</sup>

Operations are concerned with the attainment of strategic goals, in the context of the design, organization, and conduct of campaigns and major operations. Operations focus on those strategic goals in a given time and space—with an emphasis on the feasibility, impact, order, and duration of large-scale actions.<sup>14</sup>

Tactics specify how strategies and operations can be conducted via individual engagements and the associated chosen actions and maneuvers implemented during those engagements. The principal concern of tactics is the application of force and how to counter adversaries in real time.<sup>15</sup>

These levels are separate but not always distinct. However, an examination of environmental terrorism in the context of the levels of war makes it apparent that this type of terrorism has been predominantly used in a tactical or operational context. Moving forward, that could change.

## THE EVOLUTION OF ENVIRONMENTAL TERRORISM: TACTICS TO STRATEGY

Environmental terrorism has been constrained to the tactical or operational level because its efficacy has traditionally been limited to societies that are already resource vulnerable. Destroying a well in a town that is located next to a clean, freshwater lake is unlikely to place significant stress on that population. However, if drought has dried the lake, the importance of the well increases significantly. If circumstances become dire enough, the well becomes a center of gravity and a strategic concern. While resources have always been a center of gravity, their prevalence—outside of specific regions—has often made them impossible to target. Now, however, climate change and other stresses on natural resources are impacting the availability of these resources globally and increasing the importance of the reliable resource infrastructure still left.

According to the National Aeronautics and Space Administration (NASA), 2014 to 2018 were the warmest years ever recorded since the organization has been tracking global temperatures.<sup>16</sup> As the temperature climbs, weather events<sup>17</sup> are becoming more destructive, droughts<sup>18</sup> are increasing water scarcity while decreasing food production, rising sea levels are eroding coastal regions and causing the salinization of soil and groundwater reservoirs, and weather and deadly heat waves are increasingly stressing energy infrastructure. Moreover, some models predict climate change will create between 25 million and 1 billion environmental refugees by 2050, moving either within their countries or across borders.<sup>19</sup>

Understood in this context, resource vulnerability is quickly becoming a global problem,<sup>20</sup> which elevates environmental terrorism to a strategic concern. To use our earlier example, as the lakes dry around the world, the wells increase in importance—meaning water is more easily targeted and controlled. The increasing importance of the available resources left, combined with the increasing ease with which they can be targeted, means the mechanisms through which we access these resources will become centers of gravity.

As a result of growing scarcity, state level conflict may increasingly be fought with a focus on resources--the brewing tensions between Ethiopia and Egypt over the Nile being a prime example.<sup>21</sup> If conflict erupts, it is likely that environmental terrorism will increase, as resource accumulation and deprivation are at the heart of the dispute. As opportunities become more apparent, environmental terrorism will likely also be adopted by non-state actors for use in asymmetric warfare. The terrorism of the future is not only plane hijackings or bombing night clubs; it is likely to include an arsonist setting fires<sup>22</sup> through drought-ridden California or a lone wolf bombing water mains after natural disasters. Once it is no longer relegated to certain regions or chance opportunities, environmental terrorism could dominate the future of conflict.

## SOLUTIONS

In preparing for this future, the United States must begin working to strengthen the international legal framework prohibiting environment terrorism. While international laws exist that ostensibly disallow environmental terrorism, these efforts fail to adequately protect civilians and the environment during armed conflicts. Moving forward, the problematic ambiguity of these laws must be addressed, either by supporting current attempts—such as the adoption of the United Nations' draft principles governing protection of the environment during armed conflict—or by pushing for a new framework.

Understanding that even the best laws are not always followed, the U.S. Department of Defense (DoD) should also begin incorporating the climate change implications on water and food security in their projections on stability, conflict and displacement, as outlined in President Biden's Executive Order on Tackling the Climate Crisis at Home and Abroad. These projections should then inform the DoD's National Defense Strategy, with a corresponding trickle-down effect on the DoD's operational and tactical mindset. At the same time, Congress and the White House must begin allocating resources to climate-proof<sup>23</sup> our national infrastructure and bolster our current resource protections, including our electrical and water grid, while better managing unavoidable risks like wildfires.

## CONCLUSION

The evolving role of natural resources—particularly their weaponization—must be a factor in determining the United States' strategy on the world stage, both now and in the future. When considering the prevention of terrorism, how to best respond to China's One Belt, One Road initiative, or whether U.S. forces should remain in certain theaters like West Africa and Afghanistan, U.S. military and political leaders need to consider the increasing vulnerability of resources. The United States must position itself now or be doomed to a reactionary mindset in the future.

## ENDNOTES

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Female pastoralist in Marsabit, Kenya. Kandukuru Nagarjun, 2018. (nagarjun/Flickr)

## **Adapt or perish: Improving adaptation and resilience programming through conflict sensitivity and peacebuilding integration**

Lydia Cardona

Among the scientific community, there is overwhelming consensus on a key policy priority: act now on climate change to avert catastrophe. Climate mitigation approaches are critical to responding to this threat, yet across many contexts climate change impacts are already evident and generating permanent environmental change. Ensuring that societies in fragile contexts, particularly those most vulnerable to climate risks and least equipped to absorb associated shocks, can respond effectively to changing conditions makes climate adaptation another key priority. The intersection of climate risks with conditions of vulnerability such as food insecurity, poor governance, or economic weakness makes climate change a “threat multiplier”<sup>1</sup> for instability, and violent conflict is just one of many possible outcomes from this convergence.

The 2015 report commissioned by the G7, “A New Climate for Peace,” outlined seven compound climate-fragility risks—the interactions of climate change with social, environmental, and economic factors—that could destabilize societies in the decades to come.<sup>2</sup> One of these risks is the potential for unintended effects associated with climate policies. In response, a key recommendation is greater integration across three programmatic sectors: peacebuilding, climate change adaptation (CCA), and development. An integrated lens is crucial in adaptation programming, which is implicitly multi-sectoral. Yet as the report notes, “Most climate change programmes do not address conflict and often ignore future conflict impacts. In the rare instances where conflict is acknowledged, it is almost always treated as a standalone objective.”<sup>3</sup> The result is that CCA and peacebuilding programs are designed separately and often at odds with one another.<sup>4</sup> Six years on from this report there are limited practical examples of programmatic interventions linking these sectors.

## LEVERAGING THE EVIDENCE ON PEACEBUILDING-ADAPTATION LINKS

In recent years, Africa’s Sahel region has become an epicenter for the confluence of climate change and insecurity. Temperatures in the region have increased by nearly twice the global average since the 1970s and are expected to increase up to 4.0°C by the end of the century.<sup>5</sup> Pastoralist livelihoods have already suffered greatly with increasingly erratic rainfall, creating an economic and food security crisis that jihadist groups have effectively exploited. A 2019 review of peace and stabilization projects around Lake Chad determined these projects have not sufficiently addressed climate risks, at times undermining communities’ capacities to cope with climate shocks. Biodiversity and conservation organizations working in the region have similarly neglected a broader lens, ignoring key socio-political factors like conflict and local governance.<sup>6</sup> In a context where conflict and climate change are highly linked and contribute to negative feedback loops, there is a need for intersectoral solutions. As Tanzler *et. al* explain, “If strategies fail to take into account the interdependent and systemic nature of these climate and fragility risks, they will fail or, in the worst cases, exacerbate the risks they try to address.”<sup>7</sup>

Designing programs to “do no harm” in fragile contexts is essential, not only for protecting communities from unintended impacts but for ensuring program objectives are ultimately met. Beyond the imperative to avoid negative impacts, substantive evidence in the field of climate security suggests there are significant co-benefits to be gained when CCA programming is linked to peacebuilding.<sup>8</sup> Programming across both areas have certain success factors in common like inclusive governance, trust, and social cohesion. Linking these sectors can help mutually support enabling conditions for both objectives and build resilience to climate fragility.<sup>9</sup>

The U.S. Agency for International Development (USAID), a leader in linking research to practice in this area, completed an assessment of lessons associated with peacebuilding-CCA integrated programming in 2020. Relevant examples from their Horn of Africa programs, where efforts to build social cohesion were linked to sustainable livelihoods work, helped to reduce conflict and build resilience to shocks.<sup>10</sup> The evidence emerging from these programs illuminates how peacebuilding-CCA integration produces dividends that can help to meet both objectives.

## MIND THE GAP

Despite growing evidence supporting this agenda, integration across sectors remains limited. Notable examples that are emerging largely come from the peace and security field, where recognition of the destabilizing potential of climate change has advanced climate change considerations into peacebuilding interventions. In moving forward this

agenda, donor priorities can make a big difference. The European Union (EU), for example, has made embedding climate security into conflict prevention efforts a policy priority. Their Instrument contributing to Stability and Peace currently funds a project through the United Nations Environment Program (UNEP) aimed at developing tools for responding to climate-fragility risks and supporting pilots to demonstrate their application.<sup>11</sup> The Environment and Conflict program at the U.S. Institute of Peace launched a grant competition in early 2020 focused on the links between environment, violent conflict, and peacebuilding. The large number of applicants suggests an interest among practitioners and researchers in linking these agendas. Among global foundations, the Peace and Security Funders Group reports that 3% of peace and security grantmaking in 2018 went to climate security and natural resource management.<sup>12</sup> While this is insufficient for addressing the deep links between climate change and conflict, it suggests an emerging understanding of the links between climate security, conflict prevention, and peace across this sector.

Similarly, integration of peacebuilding and conflict-sensitivity remains very limited across conservation and climate change programming. The largest climate financing mechanisms, the Global Environment Facility (GEF) and the Green Climate Fund (GCF), remain quite narrow in their sectoral focus despite an emphasis on climate resilience. The links between climate change, conflict, and instability are acknowledged, but directives to simultaneously tackle these interlinked challenges are not explicit. The GEF's 2018-2022 Programming Strategy on Adaptation to Climate Change for the Least Developed Countries Fund recognizes climate security risks are linked to conditions of fragility and notes that activities in countries facing conflict and instability "must be conflict-sensitive." However, the strategy makes no further mention of how this should be achieved and the categories of support for addressing these risks are limited and do not extend to peacebuilding.<sup>13</sup> Across the GCF, where examples of peace- or conflict-related integration do exist, such as in projects in Peru and Senegal, they represent minor components of the work (at least one of these instances came about in response to concerns over triggering local conflict<sup>14</sup>). Beyond a commitment to do no harm, there is no further evidence of conflict or peace considerations in GCF operational documents, despite funding work in several conflict-affected and fragile contexts.

Given the risks associated with compound climate fragility, there is a need to go beyond narrowly-focused adaptation or development efforts. There is indeed a need for programming that is responsive to the context-specific challenges associated with a climate-conflict nexus and that delineates how this work can be achieved and its impact. Such a response would further outcomes that support global development goals and improve resilience in fragile contexts.

## **ADVANCING INTEGRATION: RECOMMENDATIONS FOR PRACTITIONERS AND FUNDERS**

The global development community can be slow to change. Billions of foreign assistance dollars are administered through development, conservation, and peacebuilding actors annually; much of this remains siloed. While many barriers may inhibit rapid uptake of new approaches, this does not mean there is a lack of interest among practitioners in pursuing them. Nonetheless, where bottom-up change remains slow, there is a strategic opportunity for donors to drive this change from the top down and leverage momentum that exists among early adopters. The U.S. government has advanced various integrated development frameworks and now has the opportunity with the Global Fragility Act and the implementation of the associated 10-year Global Fragility Strategy to link climate resilience and adaptation to conflict-reduction. Multilateral funds and foundations similarly have a unique opportunity to influence these sectors at a critical juncture through directing and incentivizing programming that supports these links.

Practitioners across peace, development, and conservation sectors, on the other hand, may seek to integrate aspects of cross-sectoral approaches with limited added investment while meeting dual objectives. Integrating conflict sensitivity within CCA programming, for example, aligns with the do no harm principles and represents a best practice that can

be embedded in early project stages to ensure programming efforts do not inadvertently exacerbate local inequalities and tensions. Similarly, peacebuilding and development actors have many entry points, such as a deeper analysis of the conflict-climate change nexus in programming contexts, integrated theories of changes for programs, and more.<sup>15</sup> Once adopted, data from impact evaluations or evidence obtained through site-specific lessons learned are needed to advance best practices from applied integrated approaches and mainstream their application more broadly. This goal could pick up from where USAID's 5-year Adaptation Thought Leadership and Assessments (ATLAS) project left off in generating critical knowledge and evidence on effective climate resilience programming.<sup>16</sup>

Ultimately, linking these agendas builds on significant evidence on how adaptation and resilience programming can be improved to effectively respond to climate fragility risks. Integrated CCA and peacebuilding programming will be essential for safeguarding climate security and building resilience to social and environmental shocks that are already resulting in profound human suffering and will likely increase in severity over the coming decades.

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(U.S. Department of Energy)

## Energy Security Strategy in a Warming World

Naz El-Khatib

In the long run, the security threats posed by climate change can only be sustainably combated by a responsible transition away from fossil fuels and toward green energy. As a result, the security community must increasingly view energy security through the prism of climate change and develop new strategies to prepare for an eventual energy mix dominated by green sources.

This approach has begun to take root in the U.S. national conversation, and analysts are increasingly beginning to work toward the target that the United States and other countries have set to achieve low carbon emission economies by roughly mid-century, aided by the rapidly growing cost competitiveness of renewable energy.<sup>1</sup> The concomitant reduction in fossil fuel usage—whether it occurs precipitously in the next decade or gradually over several, given immediate energy security needs that only fossil fuels can currently satisfy—will significantly reshape energy geopolitics along at least three dimensions surveyed below. For the United States, that reshaping will afford an opportunity to develop more durable strategies to meet the twin objectives of combating climate change and maintaining Washington's position as a global energy leader.

## CURRENT LANDSCAPE

Climate change poses one of the gravest security challenges the United States has faced. It threatens the homeland through increasingly extreme weather as well as more frequent and severe natural disasters—forces that take lives, cause billions of dollars in damage to communities, imperil livelihoods, and erode national defense infrastructure. Around the world, climate change already leads to significant loss of life, accelerates and spawns conflict and displacement, magnifies the frequency and scope of pandemics, and acts as a threat multiplier in still more areas.<sup>2</sup>

Given the leading role that fossil fuel emissions play in magnifying the threats posed by climate change, protecting U.S. national security will increasingly require a massive reduction in domestic and global fossil fuel emissions. Even if this occurs at a modest pace,<sup>3</sup> that evolving reality will create a new energy geopolitics and will demand significant strategic preparation.

Principally, analysts should continue to build new approaches in response to three emerging features of the energy landscape. First, energy production is likely to become comparatively democratized and decentralized, reducing the relative dependency on a small number of major suppliers and global supply chains while relatively increasing reliance on local renewable energy networks. Second, as energy sources change, so too will the relative geopolitical clout of producers. Finally, more robust global governance will be required, as transitioning to green energy will prove difficult without instituting global or club-based regulatory mechanisms.

## DECENTRALIZATION AND DEMOCRATIZATION

The logistics of producing and distributing renewable energy promise to generate significant power shifts in the energy landscape. While fossil fuels are one-time use stocks generally concentrated in a small number of countries, renewable energy sources are reusable flows widely dispersed and accessible by nearly any country in the world. These elemental differences have profound implications at the local, national and international levels of energy strategy.

Locally, the distribution of energy producers will more closely resemble the distribution of energy consumers, as individual people and organizations not only consume power, but generate it for their use and feed excess supply into local grids. As a result of this value-added activity, citizens and small businesses are likely to share in a higher proportion of energy wealth, empowering them both economically and in local governance.<sup>4</sup> This decentralization could also mitigate cybersecurity risks by reducing reliance on vulnerable, centralized electric grids,<sup>5</sup> though the risk of cyberattacks against digital energy systems will endure.<sup>6</sup>

At the national level, a globally-decentralized energy production system will create opportunities for nearly all countries to achieve a greater degree of energy independence,<sup>7</sup> especially for developing countries that may have an opportunity to build less fossil fuel-dependent energy systems.<sup>8</sup> This represents a significant departure from the present, where roughly 80 percent of the world's people live in oil-importing countries.<sup>9</sup> A reduced reliance on international suppliers and the associated reduction—for many countries—of external wealth transfer, should help empower current energy importing countries economically.<sup>10</sup> This relative increase in energy independence could also reduce the use of energy as a geopolitical weapon<sup>11</sup>—or its use as a tool of government or elite control within countries—though some significant vulnerabilities (e.g., renewable technology dependence, competition over resources) are likely to remain.<sup>12</sup>

Finally, internationally, growing reliance on renewable energy will reduce—though not eliminate (e.g., rare earth minerals concentrated in certain geographies)—dependence on global distribution networks. This logistical shift is

likely to beget a strategic shift that comparatively deemphasizes the importance of forward-deployed security assets to protect international supply chains. It could also reduce the incentive for major powers to economically or violently pressure fossil fuel producers to secure resource flows, though this risk may in part migrate to producers of new resources, like lithium, that are needed for renewable energy systems.<sup>13</sup>

## SHIFTING GEOPOLITICAL POWER BALANCES

On account of the aforementioned factors, the actual resources in a renewable energy future are “unlikely to acquire the geopolitical role and weight of oil and gas.”<sup>14</sup> Nevertheless, the absolute imperative of stable access to energy—and associated risks to that energy flow—will remain, as will opportunities of relative advantage and disadvantage, ensuring that energy security will continue to be a critical strategic consideration even as it acquires a new character.

Most gravely, the likely diminution in power for petrostates will place significant strain on these often fragile, yet currently powerful, regimes. Budgetary issues, an inability to finance long-standing domestic commitments, and a loss of avenues for international influence, among other factors, are likely to erode the power of these major fossil fuel producers.<sup>15</sup> Several of these countries have signaled that they will invest in renewable energy sources to mitigate against these anticipated risks,<sup>16</sup> but the challenges remain steep and the success stories thus far are limited.

How these power balances shift will depend in large part on which countries succeed in becoming competitive exporters of technology to capture, store and transport renewable power. The potential for advantage is higher for more balanced and advanced fossil fuel exporting economies (e.g., the United States) than more dependent economies (e.g., Saudi Arabia, Russia).<sup>17</sup> But competition will be considerable for all, especially with China, which has established itself as the global leader.<sup>18</sup> Other countries are also well-positioned to benefit from a shift to green energy—whether by providing energy directly (e.g., Brazil, Norway) or by providing the minerals needed for key technologies (e.g., Bolivia, the Democratic Republic of Congo, Afghanistan).<sup>19 20</sup> Of especially grave concern are exporters of civil nuclear energy infrastructure and services, especially China and Russia, which stand to benefit from an increased demand for zero-emissions energy sources.<sup>21</sup> The severe risks associated with this potential horizontal proliferation of nuclear technology (some of which is dual-use for weaponization) will require additional attention.<sup>22</sup>

## GLOBAL GOVERNANCE

To manage the risks of climate change, new global governance mechanisms will be necessary. On top of honoring current agreements, like the Paris Agreement, energy strategy must embrace as a central feature the imperative of supporting additional ambitious climate agreements either globally or among like-minded states, such as instituting a carbon price or a system of adjusted tariffs.<sup>23</sup>

Moving forward, analysts must also play a role in laying the groundwork for governing new tactics, while recognizing that “geoengineering is no panacea”—but instead an approach that targets symptoms, and may prove marginally or significantly counterproductive.<sup>24</sup> Nevertheless, the possibility that some countries experiment with these techniques will require global planning.

## CONCLUSION: TOWARDS NEW AMERICAN STRATEGIES

As the toll of climate change mounts, the United States should increasingly view energy security strategy through the prism of climate change, a necessity to mitigate the overriding security concerns posed by the climate crisis. Moreover, adopting this mindset best positions the United States to maintain its long-run energy security and energy leadership in a renewables-dominated energy future.

To capture the upside, the United States must continue developing strategies to establish itself as a clean energy superpower, including by doubling down on investments in research and development and producing renewable energy and associated technologies at significantly greater scale.<sup>25</sup> This is not only a matter of combating climate change or ensuring America's ongoing energy security; it will also be necessary to retain a strategic edge relative to other great powers, principally China—making it a critical ingredient to maintaining American leadership, as an energy superpower and beyond.<sup>26</sup>

To mitigate against future security risks, the United States must also increase defensive investments, particularly in enhanced grid security. Here the U.S. can use savings from gradually drawing down the estimated \$81 billion spent annually to protect global oil supply lines.<sup>27</sup> The U.S. must also develop strategies for managing geopolitical power shifts, principally regarding petrostates—especially among allies and partners—and nuclear exporters like Russia and China, whose activities pose serious proliferation risks. Negotiations with Riyadh over civilian nuclear energy standards foreshadow some of the complexities one can expect to increasingly encounter on both dimensions. Finally, in each of these areas, the U.S. must revive its multilateral engagement to design international agreements that advance U.S. aims in a renewable future.

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The Army's new Joint Light Tactical Vehicle. (U.S. Army)

## **Whack-a-Mole Fuel Selection: Reducing Operational Risks and Mitigating New Challenges in the U.S. Department of Defense**

Ryan Haerer

The Department of Defense (DoD) is the United States' largest energy consumer and is heavily reliant on liquid fuels for its vehicles and equipment, for both operational and installation energy. Installations are diversifying energy sources to increase sustainability and resilience of non-tactical vehicles and equipment, but still rely heavily on diesel fuel for emergency power. Operational energy selections are chosen to best deliver “the energy required for training, moving, and sustaining military forces and weapons platforms for military operations,” with environmental sustainability always being secondary to operational needs.<sup>1</sup> The DoD has put extensive effort into identifying new sources of traditional fossil fuels and “drop-in” alternative fuels for installations or operational energy that don't require changes to infrastructure or tactical equipment.<sup>2</sup>

The DoD is increasingly looking to commercial suppliers to meet those goals. The 2016 Operational Energy strategy explains that the department “led a transition to use commercial specification fuels and infrastructure as much as possible in order to reduce cost and gain access to a broader network of suppliers.”<sup>3</sup> The department has in the past routinely purchased and used commercial specification fuels for installation energy and for some operations, such as domestic National Guard activities.<sup>4</sup>

Diversifying fuel supplies where possible is smart. But when the DoD chooses commercial diesel to fuel its generators and vehicles it may have offset some logistical benefits by making itself more susceptible to new problems with commercial diesel fuel that is not yet fully understood by the petroleum industry. This could cause problems both with fuel delivery and storage equipment and the vehicles that use it.

### THE PROBLEMS WITH DIESEL FUEL

The DoD’s purchases of distillates and diesel make up 20 percent of military fuel purchases - the third highest category.<sup>5</sup> The fuel is primarily used in tactical ground vehicles, emergency power generators, and on ships. Relying on commercial diesel fuel introduces new strains on DoD’s installations and military ground operations that rely heavily on the fuel.

The fueling industry has experienced two key problems with diesel fuel that occurred over the last decade:

1. Diesel fuel storage systems in the United States began experiencing new, severe, internal corrosion issues.<sup>6</sup>
2. Degrading diesel fuel could cause engine problems in vehicles and equipment, like emergency backup power generators.<sup>7</sup>

The corrosion began appearing after the United States required technical changes to diesel fuel to reduce air pollution in 2006.<sup>8</sup> Multiple industry and government groups have researched the new corrosion problems in diesel storage infrastructure, but a full understanding of the cause or a permanent solution is still not yet known.<sup>9</sup> The Environmental Protection Agency (EPA) issued in 2016 a notice about risks of corrosion in underground fuel systems storing diesel fuel. The EPA said it is “a relatively new phenomenon and can cause equipment failure,” and “we are sufficiently concerned about potential releases that we think it prudent to alert tank owners of the problem and further investigate the issue. If left unchecked, there could be a substantial number of new (fuel) releases.”<sup>10</sup>

Other industry groups are investigating risks with diesel engines.<sup>11</sup> The Fuels Institute in November 2017 launched the Fuel Quality Council “to understand the current relationship between diesel fuel and diesel engines and work toward improving that relationship.”<sup>12</sup> The group has “initiated a project to collect and analyze empirical engine data to help qualify and quantify the types of problems being reported and their associated costs.”<sup>13</sup> None of these organizations has yet to solve the ongoing problems in commercial diesel.

### PREVENTATIVE MAINTENANCE COSTS INCREASE; ENVIRONMENTAL COSTS COULD, TOO

The DoD needs to manage these concerns to limit detrimental effects to operations and installations while research toward an ultimate solution for the fuel problem continues - if they continue to use commercial diesel. Unfortunately,

these problems are often out of sight inside of fuel systems and unrecognizable without intentional inspection.<sup>14</sup> Minimizing problems from corrosion increases maintenance requirements for preventive inspections and treatments to slow the problem. Avoiding inspection and treatment for corrosion will result in shortened life spans for equipment. If releases occur, they could cause costly environmental damage to clean up and could contaminate drinking water supplies.<sup>15</sup> In an operational setting, fuel releases caused by leaks from corroded equipment could be even more serious - they could result in diesel not being available in a tank when it is needed to refuel equipment.<sup>16</sup>

## **DIESEL FUEL COULD HINDER VEHICLES USED IN DOD OPERATIONS**

Most of the time diesel fuel reaches its destined engine without problems, but tactical equipment like vehicles or power generators could have engine problems that disrupt operations. Older tactical vehicle engines like the High Mobility Multipurpose Wheeled Vehicle (HMMWVs) are probably less susceptible to challenges with degrading fuel than newer diesel vehicles with tighter engine specifications.<sup>17</sup> But DoD's 2020 Operational Energy Budget Certification Report highlights that the replacement for the HMMWV, the Joint Light Tactical Vehicle (JLTV), "uses a commercial off-the-shelf powertrain that includes an engine, alternator, and drive train."<sup>18</sup> Exact specifications are classified, but public reports suggest that the military version engine will be similar to a commercial Duramax diesel V8 high pressure common rail engine.<sup>19</sup> If so, this could be a costly situation for DoD if it still plans to use commercial diesel fuel in the fifty thousand JLTVs it is purchasing. The Fuels Institute says, "As new high pressure common rail diesel engines have increased their share of the U.S. market, there have been increasing reports of engine breakdowns and failures presumably related to diesel fuel."<sup>20</sup>

## **INSTALLATION ENERGY: BACKUP POWER TO DOD'S CRITICAL INFRASTRUCTURE COULD FAIL**

Functioning emergency backup power supply systems are critical. Their importance is growing with increasing risks to the aging U.S. power grid from climate change with increasing extreme heat and storms. Electric power supply systems also present a "significant strategic risk from cyber attacks" according to the intelligence community.<sup>21</sup>

But as the need for backup power grows, diesel-fueled emergency backup power for U.S. critical infrastructure faces growing risks that it could fail to function when called on.<sup>22</sup> Military infrastructure and bases reliant on backup power generators face the same risks as other U.S. civilian infrastructure - and possibly greater, if adversaries value power disruptions to defense operations more than disruptions to civilian facilities.

Problems with diesel fuel can cause a backup power generator to fail when they are most needed in a situation demanding emergency power.<sup>23</sup> The generator may fail to start, fail to continue running after starting successfully, or - as we saw with operational energy risks - an untimely fuel release from the supply tank could simply result in a failure to have an adequate fuel supply during use.<sup>24</sup> Minimizing these risks is essential to ensure bases can restore adequate electric power quickly in an emergency, or sustained power can continue uninterrupted when diesel generators are supplying baseload power in an operational setting.

## RECOMMENDATIONS FOR THE DOD TO ADDRESS COMMERCIAL DIESEL USE RISKS:

1. Identify and preventatively assess all equipment that has been using or storing commercial diesel fuel in the last decade.

Fortunately, some ongoing work can help with this. According to the 2018 Operational Energy Report, the Department has partially completed a goal of “measuring Operational Energy consumption by type of equipment.”<sup>25</sup> Completing this goal will significantly help the DoD understand the scope of the commercial diesel fuel challenge, even if it was not the main intent of the effort.

2. Assess the entirety of existing DoD plans, directives, and maintenance and construction standards addressing diesel fuel and diesel-fueled equipment, including emergency generators. The DoD should convene experts to develop the most up to date information on risks and best practices, and then update all documents for relevance and consistency.
3. Develop and implement modified maintenance routines to adopt these current best practices to slow or prevent degradation when possible and avoid equipment downtime risks.

The operational energy report also shows some progress here. The DLA’s Energy Readiness Program “funded a project to establish a microbial monitoring program to reduce operational costs associated with bio-deterioration and bio-corrosion of fuels in bulk storage tanks.”<sup>26</sup> But this monitoring program must be coupled with other preventive actions, and the routine must be implemented consistently and effectively Department wide to manage the risks until a solution is developed.

The final three recommendations align with two of the three goals outlined in the DoD’s 2016 Operational Energy Strategy to *Diversify Energy Supplies to Reduce Risk*:<sup>27</sup>

*“Strategy 1: Pursue(d) renewable energy opportunities at contingency bases that harvest energy at the point of use to minimize the burden of resupplying operational forces with liquid fuel.”*

*“Strategy 2: Conduct(ed) testing and certification of fuels and platforms to prepare for bulk purchases of cost competitive, drop-in alternative fuels for operational use”*

4. Update the budget models to account for new maintenance and equipment replacement costs for diesel-fueled systems. Using this, the department should adjust its cost-benefit analyses for different fuel selections, and for alternative backup or baseload power generation equipment to those powered by diesel. (Aligns with Strategy #1)
5. Complete a holistic reassessment of distributed power options for backup power and of the tradeoffs associated with choosing commercial versus military fuel specifications for fuel given the updated costs and newly identified risks to operations of equipment failure. (Aligns with Strategy #1)
6. Identify opportunities to join or start forward-looking research efforts related to corrosion and of fuel problems with infrastructure and tactical equipment using “drop in” fuels. This effort would be in addition to previous work on alternative fuels’ compatibility with engines that suggested the DoD should focus on only “drop-in” fuels that don’t require infrastructure changes.<sup>28</sup>

Commercial diesel fuel is a “drop-in,” fungible fuel that can be used interchangeably in any diesel equipment. The new problems with internal corrosion or degradation of diesel fuel weren't covered during fuel compatibility assessments and were not expected by industry. DoD might consider putting new resources toward solving these issues should it continue to want to use standard commercial diesel fuel. Simultaneously, the department might also put research efforts towards assessing the future impact on equipment of the other type of commercial “drop in” diesel fuel called renewable diesel. It is chemically similar to fossil diesel, but is produced from renewable sources. The relationship between renewable diesel and internal corrosion or degradation of fuel is unclear. Renewable diesel is a newer product, and is currently limited in regional availability. However, global production capacity of renewable diesel is expanding exponentially, and DoD currently has purchase contracts with pilot facilities producing this type of diesel fuel. (Aligns with Strategy #2)

## CONCLUSION

The DoD's efforts to diversify its fuel supply to reduce operational risks and reduce its environmental impact from its energy use are significant and commendable. But it needs to act now to reduce its susceptibility to commercial diesel fuel problems that can shorten equipment lifespans, hamper operations, or cause emergency power to fail when needed. Carl Von Clausewitz' quote is fitting when examining the DoD challenge of selecting functional, accessible, and affordable fuel: “Everything in war is very simple - but the simplest thing is difficult.”

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Army Gen. Mark A. Milley, chairman of the Joint Chiefs of Staff, tours U.S. Space Command at Schriever Air Force Base, Colorado Springs, March 2021. (Navy Petty Officer 1st Class Carlos M. Vazquez II/DoD)

## Climate Risks to U.S. Space Force Installations and Infrastructure

Matthew Hallex

The newest branch of the U.S. military, the United States Space Force (USSF), will likely inherit some of the military bases most threatened by climate risks such as severe weather, sea level rise, and increased fire risks. Other critical infrastructure outside of the major Space Force bases are also likely to face a range of threats from climate change. This *Risk Briefer* will identify likely key USSF facilities and the climate risks they face as well as highlight some approaches to improve the climate resilience of the Space Force.

## THE SPACE FORCE AND CLIMATE RISKS

The USSF, established in December 2019, is the newest branch of the U.S. Armed Forces. While the Space Force remains part of the Department of the Air Force, it is taking responsibility for organizing, training and equipping U.S. military space forces. The responsibilities of the Space Force include space launch operations in support of the Department of Defense (DoD), NASA, and commercial space launches, the command and control of DoD satellites, and the operation of a global network of ground-based sensors that provide space surveillance and monitor ballistic missile launches throughout the world to prevent surprise attacks on the U.S. homeland.<sup>1</sup>

Units assigned to Air Force Space Command and 23 other units have been selected for transfer from the Air Force to the Space Force.<sup>2</sup> As there are no plans to relocate existing units or infrastructure, it is likely that Air Force bases that currently house these units will become Space Force bases in the future. Additionally, Space Command's provisional headquarters will remain at Schriever Air Force Base (AFB) in Colorado Springs, Colorado for the next six years while a permanent headquarters is located and built.<sup>3</sup> Table 1 below lists probable Space Force installations and the climate threats that they face.

The table draws from the 2019 *Report on Effects of a Changing Climate to the Department of Defense* (DoD) and identifies demonstrated threats as well as those likely to manifest over the next twenty years. Bases may face recurrent flooding caused by storm surges from hurricanes and other intense weather events that may be worsened by climate change as well as the effects of sea level rise. Droughts can affect installation water supplies, increase wildfire risks, and create conditions that restrict training and other activities. Wildfires threaten base infrastructure and restrict training and other operations.<sup>4</sup>

**TABLE 1: CLIMATE THREATS TO LIKELY SPACE FORCE BASES**

|                                                     | RECURRENT FLOODING |           | DROUGHT |           | WILDFIRES |           |
|-----------------------------------------------------|--------------------|-----------|---------|-----------|-----------|-----------|
|                                                     | CURRENT            | POTENTIAL | CURRENT | POTENTIAL | CURRENT   | POTENTIAL |
| VANDENBERG AFB<br>(CALIFORNIA)                      | YES                | YES       | YES     | YES       | YES       | YES       |
| BUCKLEY AFB<br>(COLORADO)                           | NO                 | YES       | NO      | NO        | YES       | YES       |
| GREELEY AIR<br>NATIONAL GUARD STATION<br>(COLORADO) | YES                | YES       | YES     | YES       | YES       | YES       |
| PETERSON AFB<br>(COLORADO)                          | NO                 | NO        | NO      | YES       | YES       | YES       |
| SCHRIEVER AFB<br>(COLORADO)                         | NO                 | NO        | YES     | YES       | YES       | YES       |
| CAPE CANAVERAL AFS<br>(FLORIDA)                     | YES                | YES       | NO      | NO        | YES       | YES       |
| PATRICK AFB<br>(FLORIDA)                            | YES                | YES       | YES     | YES       | YES       | YES       |

Source: Report on Effects of a Changing Climate to the Department of Defense, 19-20.

Such climate risks threaten mission effectiveness at these installations and the ability of the Space Force to operate. The small number of Space Force installations and the reliance of military space operations on expensive and highly specialized critical infrastructure heighten the risks to U.S. national security – damage to any single Space Force installation could negatively affect the U.S. ability to access space or create gaps in U.S. space surveillance or strategic warning capabilities.

## THREATS TO SPACE LAUNCH CAPABILITIES

The Space Force operates space launches on both coasts of the United States in support of DoD, NASA, and commercial space launches. West Coast launch operations are conducted from Vandenberg AFB in California – a base that a 2019 Air Force report identified as the base most vulnerable to climate threats.<sup>5</sup> East coast launch operations are conducted from the adjacent Cape Canaveral Air Force Station (AFS) and Patrick AFB – the fourth most vulnerable Air Force base area according to the same report.<sup>6</sup>

While Vandenberg AFB is vulnerable to a wide range of climate change threats, the most pressing in recent years has been wildfires. A wildfire in 2016 “burned over 10,000 acres and came very close to two Space Launch Complexes.”<sup>7</sup> This caused a delay in a scheduled space launch and destroyed electrical power lines, forcing some base facilities to operate on generators. Smaller wildfires in 2017 that did not threaten structures on the base forced evacuations of some personnel.<sup>8</sup>

Rising sea levels and associated flooding risks are more pressing for space launch operations on the east coast. Much of Cape Canaveral AFS and NASA’s adjacent Kennedy Space Center are located on coastal marshlands that are only five to ten feet above sea level<sup>9</sup> and are facing increasing coastal erosion and threats from more severe storms.<sup>10</sup> Patrick Air Force Base faces many of the same risks – in 2017 Hurricane Irma damaged much of the base’s facilities and housing and forced the postponement of two space launches.<sup>11</sup> Hurricane Michael narrowly missed both bases in 2018 before Hurricane Florence went on to do billions of dollars in damages to the Marine Corps’s Camp Lejeune.<sup>12</sup>

Damage to the launch facilities on either coast could deny the United States the ability to launch assets to entire orbits in space from its own territory. Space launches are conducted over open water to prevent rocket stages and other debris from falling on inhabited areas – geographic constraints govern the direction of rocket launches and therefore the ultimate orbits of their payloads. Vandenberg AFB is the only location in the United States to launch into polar orbits – those used by most intelligence and many weather satellites. Similarly, Cape Canaveral is the only location used for launches into geosynchronous orbit – the orbit used by most communications and missile warning satellites. Climate-related damage to either facility could thereby not only do billions in damage to infrastructure but could deny the DoD assured access to space.

## THREATS TO CRITICAL SPACE INFRASTRUCTURE

In addition to large bases housing hundreds of thousands of Space Force personnel, U.S. military space operations rely on a global network of sensors and communications facilities that are threatened by climate change.

In November 2019 the U.S. Air Force announced that it had begun the final testing of the new Space Fence Radar. Once operational, the radar, located on Kwajalein Atoll in the Pacific Ocean, will allow the Space Force to track five times as many satellites and pieces of debris in low earth orbit than present systems.<sup>13</sup> Kwajalein is one of the atolls

that make up the Marshall Islands, a country that declared a “national climate emergency” the month prior due to the existential threat posed by sea level rise and other effects of climate change.<sup>14</sup> A DoD-funded study by the U.S. Geological Survey indicates that regular inundation of Kwajalein’s freshwater supply by the ocean would render it undrinkable within the next 15 years. Even if fresh water was supplied from the outside, rising seas will likely cause regular flooding of the entire atoll by as early as 2050.<sup>15</sup> A 2018 report by the Center for Climate and Security’s Military Expert Panel affirmed these risks to DoD assets on Kwajalein.<sup>16</sup>

Climate change is also threatening some of the island bases for the Air Force Satellite Control Network (AFSCN). The AFSCN is a worldwide network of antennas that enable command and control of U.S. military satellites. One vital AFSCN site is located on the small British-owned island of Diego Garcia in the Indian Ocean. Rising sea levels threaten the AFSCN site as well as the U.S. airfield and harbor on the island, which today is only an average of one meter above sea level.<sup>17</sup> Another AFSCN site is located on the Pacific island of Guam where bases face increasingly severe storms<sup>18</sup> as well as threats to its water supply from rising seas.<sup>19</sup>

The consequences of climate change have already made themselves apparent in the Arctic. Thule AFB in Greenland is vital to U.S. operations in the Arctic and houses an AFSCN site and one of the Space Force’s Early Warning Radars that provide warning of incoming ballistic missiles and track satellites and space debris.<sup>20</sup> Thawing permafrost has already caused damage to the airfield and other structures at Thule.<sup>21</sup> Higher temperatures are also exposing Cold War-era toxic waste buried in the ice, potentially threatening U.S. personnel at Thule as well as nearby communities.<sup>22</sup> While permafrost thawing is not a threat to the radar based at Clear AFS in Alaska, it faces an increased risk of wildfires due to climate change over the coming decades.<sup>23</sup>

## ADDRESSING CLIMATE RISKS TO SPACE FORCE INSTALLATIONS

Given the threats to Space Force bases and capabilities, a proactive approach to addressing climate change risks will be necessary to protect critical infrastructure, reduce the risk of costly damage to installations, and provide assured space capabilities.

One source of guidance to such an approach are the General Accountability Office (GAO) assessments of the climate resilience of overseas and domestic DoD installations.<sup>24</sup> While neither of these studies directly evaluated likely future Space Force bases or infrastructure, these studies identified both shortcomings of climate planning common to a broad range of DoD installations as well as issues with broader DoD guidance and coordination.

GAO’s recommendations include identifying and making use of authoritative projections of climate risks, conducting installation-specific assessments of climate risks and developing appropriate resilience plans, and ensuring that climate projections are incorporated into installation master plans.<sup>25</sup> GAO also recommended the services work with host nation governments to formalize climate adaptation plans for overseas installations.<sup>26</sup> The Space Force should evaluate the challenges to its own installations and adopt these recommendations wherever appropriate.

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GEO-X Summit in Geneva, 2014. (U.S. Mission Geneva/Eric Bridiers)

# A Digitized Earth Means Better Climate Security

David Harary

Welcome to the era of unprecedented environmental and economic change. From mega-wildfires in Australia to bomb-cyclones in the United States, the seemingly endless stream of extreme weather events reminds us that this is a time of tremendous climatic flux. The word ‘unprecedented’ describes not the occurrence of climate change, but the speed at which it’s happening.

Over the next century, average global temperatures will likely rise by as much as 4 degrees Celsius.<sup>1</sup> Global sea levels could climb by up to 6.5 feet.<sup>2</sup> Global biodiversity is collapsing.<sup>3</sup> Frequent and high magnitude droughts, floods, hurricanes, and other natural disasters will only get worse, cost greater economic damage, and pose further risk to human lives.<sup>4</sup>

The ecological foundation of our global civilization is breaking, but our capability in managing these threats is about to drastically improve.<sup>5,6</sup> Enter the digital ecosystem. The coming revolution of computational sustainability, ecological informatics, smart Earth technologies and digital Earth studies combined with space-based Earth observation and artificial intelligence will transform our methods of managing environmental threats.<sup>7</sup> “We need to bet big on digital technologies precisely because nothing else has the potential to achieve the kind of transformation our planet needs” says David Jensen, head of the UN’s environmental peacebuilding program in Geneva.<sup>8</sup>

One of the most impactful digital and diplomatic advancements is the intergovernmental Group on Earth Observations’ Global Earth Observation System of Systems or GEOSS.<sup>9</sup> This alliance of more than 100 countries has created an open source platform to integrate sensing and observations together, while implementing common technical data standards. More than 400 million open data resources from at least 150 international institutions now contribute to GEOSS.<sup>10</sup>

GEOSS has become vital for creating a common language that all scientists can access, understand, and collaborate on. The common language and data the platform has created allow governments, businesses, farmers, aid organizations, and other groups to make more informed decisions about looming environmental disasters. When coupled with economic, social, political, and other data, tools like the GEOSS can serve as a “cohesive package” that “makes a tremendous difference for decision makers,” says Rod Schoonover of the Council on Strategic Risks, and former Director of Environment and Natural Resources at the U.S. National Intelligence Council.<sup>11</sup>

Providing end users with greater access to observational data that can increase impact is the goal. However, making this information accessible and open access is perhaps the most crucial ingredient. That’s because increasing environmental intelligence doesn’t just stop once the data has been shared. Instead, new methods of analyzing and refining that data can be continuously improved in shared working environments across organizations and governments. Such connectivity and collaboration is helping build entirely new creative and innovative geospatial tools.

Consider Australia’s open data cube initiative, which actively provides users with a software library, data tools, and perhaps most significantly, a community fostered to develop and share uses of satellite imagery for meaningful impact.<sup>12</sup> Australia’s platform is now being leveraged to also develop the African data cube.<sup>13</sup> Joshua De Salis Sophrin, CEO of an advanced computing company in San Francisco says that “instead of having to hire in-house, organizations can now tap into a community of over 500 open-source developers.”<sup>14</sup> This makes projects easier for companies and allows new users to rapidly learn how to use this information for real-world applications.

The democratization of Earth observation has set the stage for a geo-revolution defined by rigorous quantitative analysis and machine learning processed on the cloud.<sup>15,16</sup> “With cloud technology and machine learning, we can now process time series satellite images of the entire Earth in only a few days - a feat that would have taken hundreds of years in 2000. It is now economically feasible to receive near real time information about environmental change at the global, national and local scales,” says Jensen.<sup>17</sup>

A constant stream of Earth imagery and remote sensing data from satellites are already beginning to ingest into advanced algorithms that can easily monitor, ascertain and predict environmental and climate risks.<sup>18</sup> Each new rainstorm, drought, flood, and tornado will feed these complex algorithmic brains and deliver improved ways of understanding and predicting their next occurrences. “The easier it is for researchers and scientists to integrate their data into artificial intelligence workflows, the more effective the algorithms become,” says De Salis Sophrin.<sup>19</sup>

Continuous improved understanding of our Earth system will almost certainly introduce new paradigms for how we manage and use land, water resources, and habitat. Greater optimization and efficiency will allow for easier

implementation of sustainability and conservation initiatives, including the Sustainable Development Goals and the range of global environmental agreements. However, the beneficiaries of the digital ecosystem go well beyond the bounds of environmental stewardship - insights must also begin to directly influence markets, consumer behavior, and global policymaking.

One of the most important sectors gaining from the geo-revolution is the security community. An example of the digital ecosystem's power in this arena is the introduction of enhanced anticipatory intelligence on the scarcity of food and water.<sup>20</sup> Artificial intelligence, higher-resolution satellite imagery, and advanced computing technologies may soon provide governments with a greater capacity than before to mitigate and respond to resource shortages before riots, civil unrest, and political instability break out.<sup>21</sup> "Compound and concurrent environmental stresses are likely to be especially destabilizing to people and nations, so even modest foresight capabilities could be invaluable for state stability," says Schoonover.<sup>22</sup>

Jensen goes a step further, arguing the need for clear geospatial tools for decision-makers, "we need a global environmental stress index and planetary risk dashboard. We need to see where different environmental and climate stresses are accumulating. And we need to know where these hotspots might lead to negative outcomes such as forced migration, maladaptation and social conflict."<sup>23</sup> As for the digital ecosystem's role in building these tools, Jensen argues, "mapping, monitoring and mitigating environment and climate risks will increasingly depend on leveraging big data and digital technology such as AI."<sup>24</sup>

Many scientists argue this is our last decade to implement climate adaptive strategies that can reverse our direct course towards a catastrophic climate scenario.<sup>25</sup> "We are at a pivotal moment in environmental history. Our choices over the coming decade on how to deploy digital technologies present an unprecedented opportunity to protect our environment," argues Jensen.<sup>26</sup> In other words, harnessing the power of the digital ecosystem will likely not just be important, but essential if we are to ensure our environment is safe and our society secure in this era of change.

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50 Let Pobedy, a Russian Arktika-class nuclear-powered icebreaker, on North 88° (Kiselev.d/Wikimedia Commons )

# Action in the Arctic: Lack of U.S. Leadership Expands Opportunities for Russia and China

Olivia Burzynska-Hernandez

## BACKGROUND

The scientific evidence is clear; the Arctic landscape is rapidly changing due to climate change. Multiple scientific studies have concluded that melting ice rates in the Arctic are increasing<sup>1</sup> and ocean temperatures in the region are rising faster than expected.<sup>2</sup> These environmental changes have altered the geopolitical landscape of the Arctic by creating new shipping lanes and exposing new sources of energy,<sup>3</sup> causing Russia to ramp up its military presence to protect its Arctic coastline and economic equities.

While U.S. global competitors like Russia and China continue to expand their military and economic presence to capitalize on these geopolitical changes, the United States should take a proactive leadership role to manage Arctic regional rules and norms, after remaining dormant under the Trump Presidency. There are signs of change - Secretary Blinken recently emphasized the need for the Arctic region to remain an area of “peaceful cooperation and collaboration.”<sup>4</sup> At the same time, the U.S. military has come to an agreement with Norway to build facilities on their military bases and

NATO military exercises in the region have increased.<sup>5</sup> While the United States' increased interest in the Arctic is promising, Russia's new Chairmanship to the Arctic Council and China's increased engagement in the Arctic will potentially dictate new regional (and global) rules and norms that could ultimately put pressure on U.S. national security interests.

This brief provides an overview of Russian and Chinese engagement in the Arctic, analyzes the United States' reaction to these engagements, and provides recommendations for U.S. political leadership to proactively lead in the Arctic.



## U.S. COMPETITORS IN THE ARCTIC

Geopolitically, Russia represents the Arctic status quo while China represents new non-Arctic states vying for global management of the region. However, these opposing strategies have not hindered the ability of Russia and China to aggressively pursue their interests in the Arctic, at times overlapping into a partnership the United States should watch closely. As U.S.-Russian relations have turned frosty in the last decade, Russia has looked to Asia to support its Arctic exploration projects. Key examples of this partnership include Russia's state-owned energy companies Rosneft and Gazprom cooperating with Chinese partners in the Arctic seas; and Russia contracting Chinese companies to modernize the Russian Arkhangelsk seaport and construct the Russian White Sea–Komi–Ural (Belkomur) rail link in the Arctic.<sup>6</sup> The following section delves deeper into each country's motivations for its activities in the Arctic, and the increasing pressure they are placing on the United States.



Google Map  
Illustration of  
Russian Military  
Installations,  
courtesy of the  
[American Security  
Project](#)<sup>7</sup>

## RUSSIA

The Arctic is a top economic priority for Russia. Russia's self-proclaimed "Arctic Zone of the Russian Federation" (Moscow's official description of an area that makes up 40 percent of the entire Arctic area) generates 12 to 15 percent of the country's gross domestic product (GDP); including 80 percent of Russian gas and notable extraction of nickel, diamond, and rare earth metals.<sup>8</sup> Overall, the Arctic provides a quarter of the country's exports and provides attractive alternatives for Russian shipping routes, particularly along the Northern Sea Route (NSR),<sup>9</sup> which creates a key economic connection between East Asia and Western Europe.<sup>10</sup>

While maintaining its economic interests in the region, Russia has also expanded its military presence, prompted by increasing geopolitical tensions with the West.<sup>11</sup> Russia has recently reactivated several military Arctic outposts and established new military bases in the region, thanks in large part to its sizable icebreaker fleet. Ultimately, Russia's strategy in the Arctic is to maintain and strengthen its status in the region, particularly as its relationship with the West becomes more tense and the region becomes more open to interested countries, i.e. China.

## CHINA

In the last decade, China has ramped up its political and commercial presence in the Arctic. In 2013 China was added as an observer to the Arctic Council Forum, and later declared itself a "near Arctic state."<sup>12</sup> Five years later, the nation released its "Polar Silk Road Initiative," a white paper encouraging the development of maritime infrastructure and commercial trial voyages in the Arctic. Outside of its economic interests with Russia, China has particularly focused its Arctic expansion on Greenland. Melting ice, due to climate change, has drastically exposed the country's vast earth minerals reserves. China accounts for more than 70 percent of global rare earth supplies and has a "near monopoly" over its global processing capacity.<sup>13</sup> Unsurprisingly, China has strategically placed itself to benefit from Greenland's rare earth minerals to maintain its economic dominance in this sector. In 2019, Beijing's threat to cut off rare earth exports to the United States caused "alarm bells" in the Administration, and the Pentagon started to look to fund rare earths production in the United States and abroad.

At face value, China's Arctic strategy largely speaks to developing a holistic, global approach to managing the Arctic. While these intentions are not theoretically "offensive," Chinese actions in other parts of the world, including the South China Sea, indicate the country is not afraid to demonstrate military strength to assert dominance.<sup>14</sup> Perhaps concerning for Arctic Council members, like the United States and Russia, China has begun to question whether the Council's leadership role should be the principal means for addressing Arctic issues. Through its bilateral relationships with Arctic Council members, like Russia, and the implementation of its Polar Silk Road Initiative, China is strategically aiming to become a policy rule maker in the Arctic.

## U.S. RESPONSE TO INCREASED ARCTIC ENGAGEMENT

In the United States, there is a political and military disconnect when it comes to providing a leadership role in the Arctic. While U.S. military and intelligence actors have taken notice of the rapid geopolitical developments in the Arctic; U.S. government officials have been slightly slower on the uptake. Former Coast Guard Vice Commandant

Peter Neffenger, who spent four years crafting the Arctic strategy at the U.S. Coast Guard, recently said “to win a race, you actually have to be in the race....And the United States, to a large extent, has failed to engage in substantial ways in the Arctic...The United States has taken a wait-and-see attitude.”<sup>15</sup>

While the United States has not been completely politically inactive in the Arctic, it has responded reactively to increasing Russian and Chinese dominance in the region. For example, in April 2020, the United States announced a \$12.1 million economic aid package for Greenland, specifically presented as a reaction to Chinese and Russian activities that “aimed at increasing their presence and influence in Greenland.”<sup>16</sup> Meanwhile, military and intelligence agencies continue to request that Congress consider stronger U.S. leadership in the region. The National Defense Authorization Act of 2020<sup>17</sup> included four provisions that address the Arctic and are directly related to national security. And in March 2020, the Honorable Dr. James Anderson, Performing the Duties of Deputy Under Secretary of Defense for Policy, testified before Congress, stating, “competition in the Arctic must be considered in the context of the relationship between the Arctic and key regions identified in the NDS [National Defense Strategy]. The Arctic is a potential avenue for expanded great power competition and aggression, since it is located between the two key NDS regions (the Indo-Pacific and Europe) and the U.S. homeland.”<sup>18</sup>

While the new Biden Administration has halted drilling in the Arctic National Wildlife Refuge, the administration should create a unified, strategic approach to protecting national security interests in the Arctic. As U.S. competitors like Russia and China continue to gain military and economic advantages in the region, the United States must take a proactive approach in order to assert political leadership and build a set of standards and norms that protects its interests.

## RECOMMENDATIONS

1. **The United States should reinvigorate the U.S. Arctic Executive Steering Committee.** This would help unify U.S. strategy and organize its political and military objectives in the region, creating the foundation to make proactive leadership decisions in the Arctic Council and other multilateral fora.
2. **The United States should work proactively and collaboratively with the Arctic Council** in an effort to balance Russian military dominance and China’s increasing ventures into the region. This includes working with other Arctic States to create consensus on issues that arise, and ensuring that all parties to the Council are able to agree on commitments moving forward.
3. **The United States should ensure its National Security Strategy** acknowledges geopolitical and climate changes in the Arctic, and should develop a clear military strategy for the region that is supported by political objectives. This includes investing in the unique equipment and training needed to train in the Arctic, including investing in cruise missile defense<sup>19</sup> that is affordable, and continuing to build up the U.S. icebreaker fleet for the U.S. Coast Guard.

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A woman rides her bicycle with her baby to collect water for her family, Sorobouly village near Boromo, Burkina Faso. . (Ollivier Girard/CIFOR)

# Mainstreaming Gender into the Climate Security Agenda

Emily Sample

## INTRODUCTION

The United Nations Security Council (UNSC) Resolution 1325 on Women, Peace and Security (WPS) was adopted in October 2000, and has since been reaffirmed through nine subsequent UNSC Resolutions. Among other central issues, the WPS agenda calls on all UN member-states and the UN Secretary-General to integrate gender perspectives in the analysis of international security issues.<sup>1</sup> Climate change mitigation and adaptation processes are acknowledged as critical components of international security. A growing body of research suggests that there are multiple intersections between gender equity and the effects of climate change, including social inequality, poverty, poor state infrastructure, and food insecurity. Gendered vulnerability is an increasing threat as climate change exacerbates political instability.

There are a growing number of scholarly resources on the relationship between climate change and women that are slowly being connected to the more established literature on women and conflict. The nexus between the three is a now burgeoning topic. In 2013, the UN began to broach this intersection, arguing:

Conflict almost invariably has an impact on the availability and use of natural resources such as land, agricultural crops and water, which underpin the basic needs of a large majority of the world's population. Women—particularly those in rural settings—tend to be disproportionately affected by these changes, as they generally depend on these resources for their livelihoods, and are most often the ones responsible for acquiring and using them to meet daily household needs. Furthermore, conflict significantly disrupts social and cultural management systems for natural resources, especially land. In conflict-affected contexts, this can have acute implications for women, as their access to land is typically dependent upon the social structures of their communities.<sup>2</sup>

Women's vulnerabilities and experienced inequalities in the face of a changing climate are essential to understanding the breadth and urgency of this issue. The key to mainstreaming gender into the climate security agenda is in recognizing the power of UN Security Council Resolution 1325. Gender is not an aspect of climate security that should be analyzed and addressed in its own silo, rather it is an integral piece of the climate security puzzle, without which any international security policy is incomplete.

## FOOD, WATER, AND ENERGY RESOURCES

The effects of climate change can have broad gendered implications due to the systematic inequalities of how women gain access to and control economic, social, and political resources. Due to gendered societal hegemony, women are often responsible for the home, which in many cases includes not only the gathering of water and energy resources, but also the care and management of a family farm.<sup>3</sup> Water and energy security are two of the key cross-cutting issues of climate change and gender equity.<sup>4</sup> Women are more likely to be responsible for gathering water and firewood, making them vulnerable to sexual assault, kidnapping, and myriad other violations when forced to collect resources, especially in conflict settings.<sup>5</sup> Traveling further to collect these resources diminishes women and girl children's capacity to work or seek education outside the home.

Women are on the forefront of the fight against climate change worldwide due in part to this responsibility for managing the family and community water, food, and energy resources. In understanding women's role in climate security, it is essential to understand women's role in making household-level food, water, and energy decisions, and how these decisions manifest culturally and regionally. Women's labor in managing subsistence farms is neither acknowledged or financially compensated, but these tasks take a huge amount of skill and training. This makes women key decision-makers in what, when, and how to plant, as well as if and how to use pesticides. These decisions are often discussed between women in the same village or region through informal networks that can be mobilized in adopting key climate mitigation and adaptation processes.

In addition to facing direct violence, women often face structural inequalities that create barriers for mitigating the effects of a changing climate. Due to their societal role as caretaker for children and the elderly, women are more likely to suffer food shortages, and less likely to be able to migrate to seek physical and financial security and opportunity. In some cases, women are still restricted from owning land or making independent financial decisions, and therefore lack capital for equipment, livestock, or other necessities to utilize the remaining natural resources. If women are not

able to make legal and financial decisions for themselves, their family, and their lands, they cannot make adaptive decisions about cropping periods, seeds, pesticide use, or take advantage of international assistance programs aimed at climate change mitigation.<sup>6</sup>

## LAND RIGHTS

Formal and informal land rights are a growing environmental and climate security issue. Women worldwide struggle to claim and maintain titles to their own land and property in a male-dominated and increasingly litigious society.<sup>7</sup> This is one factor that puts women at a high risk for food insecurity.<sup>8</sup> Ownership of the land is not always written and documented to the Western legal standard. As land rights become less flexible, areas that were previously available for public use in growing food or grazing and moving cattle are now private property, and fiercely defended as such. These lands are also being taken by governments as unclaimed property and sold to the highest bidder. In addition to breaking down community ties, the resulting land use from land grabs can have massive impacts on not only their immediate community, but the climate as well if the land is then deforested or degraded.

In urban settings, land ownership takes on a different emphasis. Over-crowded cities have grown quickly and disproportionately, and informal housing, or slums, stand next to skyscrapers. With little or no urban planning, many areas lack access to water or electricity. Conditions in urban areas are forecasted to deteriorate quickly in the face of natural disasters or extreme food and water shortages due to the fragility of water and energy grids. But even barring catastrophic weather events, urban structures and the needs of an urban population are vastly different from the needs of people living in rural settings. In addition to formal public services like police and fire protection, there are informal services that this sprawl may make harder to access, like domestic violence shelters and civic associations.<sup>9</sup> Women's ability to access safe, affordable, sustainable housing has myriad effects on their financial and physical independence.

## CONCLUSION

In assessing the future success of the climate security agenda both domestically and internationally, the gendered burden of climate change cannot be understated. Looking ahead toward the global threat of climate change, "future policy responses should take into account the gendered way in which women are excluded from market systems and that access to natural resources occurs along gendered lines which can be destabilized through development policies inherent in Western, market-based approaches."<sup>10</sup> It is essential to reframe our concept of peace and climate security to include gendered understandings of adaptation and mitigation. Without integrating gendered analysis into every level of international security, climate security policy will continue to miss crucial conflict triggers, as well as opportunities for innovative adaptation and mitigation strategies.

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Man working his drought affected garden in Gusau, Nigeria. (Karen Kasmauski/MCSP)

# Climate Conflicts in Nigeria: How Media Reporting on “Amoteku” Militia Undermined Mitigation Efforts

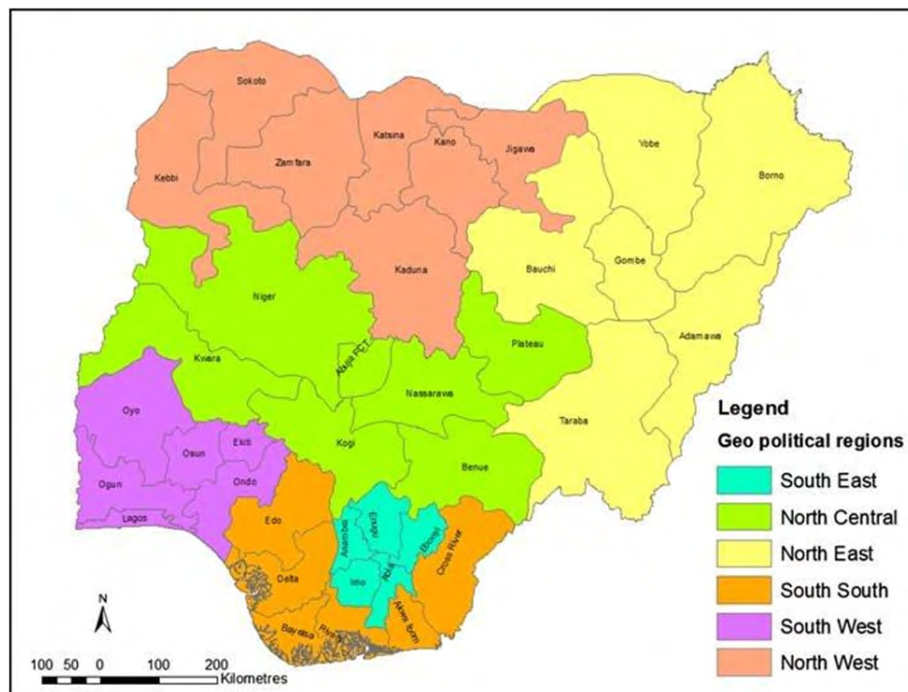
Rabiou Inoussa Yari

## INTRODUCTION

Land erosion exacerbated by climate change is prevalent in the Sahel and particularly in northern Nigeria, where the resulting destruction of ecosystems have contributed to conflicts between Fulani herdsman and farmers over access and control of grazing and farming lands.<sup>1</sup> The Federal Government of Nigeria (FGN), under President Muhammadu Buhari, has initiated two major programs--the RUGA settlement of herdsman and National Livestock Transformation Plan (NLTP) to address the structural causes of the conflict with limited success. To counter the insecurity, state governments have sponsored local militias such as Amotekun, a move that creates friction with federal authorities. This brief seeks to investigate the extent to which online Nigerian English newspapers framing of “Amotekun” or “leopard” in Yoruba militias shapes public perception of the force. Also, it argues that the rhetoric contributes to politicization of the militia, while also paralyzing the FGN’s efforts to manage the environmentally-induced migration of herdsman, and develop climate change mitigation strategies. It concludes with recommendations and implications for peace and security in Nigeria.

## BACKGROUND

Nigeria has only one National Police Force (NPF) deployed across the country's 36 states.<sup>3</sup> Ubiquitous insecurity is overstressing this force. The online newspaper *The Guardian Nigeria* reported that "23 of the 36 states have militias operating under the authority of state or local governments, especially in areas affected by Boko Haram, where they are organized under the Civilian Joint Task Force (CJTF)."<sup>4</sup> To tackle the instability due to herdsmen migration to farmlands, governors of Lagos, Oyo, Ogun, Ondo, Osun and Ekiti states officially launched the "Amotekun" militia on 6 January 2020.<sup>5</sup> The militia involves traditional rulers, vigilantes and hunters engaged in combatting terrorism as well as kidnapping, and robbery and destruction of crops often attributed to the Fulani.



Map of Nigeria with the six geopolitical zones ©ResearchGate.<sup>2</sup>

In reaction to the formation of Amotekun, the online news portal Sahara Reporters said the FGN had declared Amotekun "illegal and unconstitutional."<sup>6</sup> Later, the Nigerian Vice President, a Christian and native Yoruba, Yemi Osinbajo, met with the sponsoring Governors "to put in place the necessary legal instruments" to validate the organization in each of the states.<sup>7</sup>

The inauguration of Amotekun took place nearly nine months after the governors rejected the FGN's grazing reserves program mostly known as the RUGA Settlement, which would have helped alleviate the root problem of local conflict over declining resources.

## THE FEDERAL GOVERNMENT'S CONFLICT AND CLIMATE CHANGE MITIGATION INITIATIVES

RUGA and NLTP are the two landmark projects that the FGN undertook to resolve climate change-induced conflict and scarcity of fertile lands. On 11 May 2019, President Buhari, a Muslim Hausa/Fulani, approved the over \$6 Million RUGA settlement in his Government's attempt to help the herdsmen settle in camps to eventually mitigate the conflict between them and the sedentary farmers.<sup>8</sup> So far, 11 of the 19 northern governors have voluntarily launched the RUGA pilot program within their states.<sup>9</sup>

Prior to that, the FGN had launched the \$500 million, 10-year NLTP in June 2018 in "willing states."<sup>10</sup> It identified 141 out of the 416 grazing reserves across Nigeria with a total of 3.4 Million hectares of land. In June 2019, the presidency disclosed that the policy would create communities of herders with modern grazing reserves, abattoirs, ranches, hospitals, schools, roads, water supply and electricity to prevent them from moving around.<sup>11</sup> So far, 13 states have started implementing the NLTP.<sup>12</sup> But, a major concern is how the Nigerian conflicts Early Warning Systems (EWS) would support these programs.<sup>13</sup>

## MEDIA COVERAGE UNDERMINES THE FEDERAL INITIATIVES

The International Crisis Group (ICG) asserts that regional outlets played an important role in framing the farmer-herder conflict, particularly in the north.<sup>14</sup> ICG reports that the conflict has killed more than 1,300 people since January 2018 and is deadlier than Boko Haram. In June 2019, *Punch* characterized RUGA “as colonies that the FGN conceives for all the states.”<sup>15</sup> Prior to that, on 24 December 2019, Africa Report called it a “land grab.”<sup>16</sup>

Similarly, the media appears to link the NLTP with the RUGA project contributing to the further polarization of the initiatives. On 22 April, Africa Report alleged that the Government had “rebranded RUGA into NLTP despite the Nigerian Vice President’s dismissal of the claims.”<sup>17</sup> <sup>18</sup> Despite this, the Southern and Middle Belt politicians and special interest groups rejected the project and labeled it “an obnoxious ethnic domination program and colonialism agenda that seeks to create homelands for herdsmen all over Nigeria.”<sup>19</sup>

Surprisingly, the reporting highlights that Fulani leaders in the south support Amotekun subject to recruitment of their children.<sup>20</sup> <sup>21</sup> But the Yoruba lawyer Fani-Kayode argued that Amotekun is for “SW citizens only and does not include the tribe of Fulani,” and “recruiting them would be like recruiting hyenas into an army of lions.”<sup>22</sup>

## RECOMMENDATIONS

To curtail the violence, the FGN should abandon its top-down policy approach and create conditions for grassroots climate change mitigation frameworks that would give the opponent states choices to implement the RUGA and NLTP programs. Also, the federal and state authorities should re-engage the media and all the stakeholders in the conflict and hold them accountable for inflammatory rhetoric when reporting on the conflict. Lastly, it should revamp the country’s conflict alert systems and align them with its climate security policy.

## CONCLUSION

Recurring insecurity largely due to resource competition caused by climate change has killed more people than terrorism in the country and continues to undermine Nigerian federalism. Despite the FGN’s exclusive constitutional prerogatives to legislate over security matters, southern states have initiated ethnic-based militias such as Amotekun to counter the threats of herdsmen to local farmers. Worse still, media reports on Amotekun appear to be distorting public perception and contributing to paralysis of strategic federal climate change and conflict mitigation programs. To solve this, the FGN must shift its strategy from enacting legislation to more inclusive national discussions and grassroots efforts.

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Office of Personnel Management in Washington, D.C., 2012. (Wikimedia Commons)

# Academic and U.S. Government Talent Management in Climate Security

Jessica Libertini

## A GROWING NEED FOR TALENT

The impact of the climate crisis on global security is increasingly visible. Storms of rising frequency and intensity stress the resilience of even the world's wealthiest nations.<sup>1</sup> Gradual changes in agricultural seasons drive food insecurity in many of the world's most fragile nations, driving migration and conflict.<sup>2,3</sup> At the same time, sea-level rise threatens the erasure of the sovereign territory of entire island nations.<sup>4</sup>

Consequently, a growing number of organizations are addressing climate security issues and acknowledging the importance of investing in the nexus of climate and security.<sup>5</sup> However, as the field is growing, talent is being poorly managed on both the supply and demand sides. This largely stems from a lack of clear definition on what a climate security specialist is, or the training required to become one. The climate security sector, by its nature, spans multiple disciplinary domains.<sup>6</sup> Experts in climate science, development, water, agriculture, defense, economics, international relations, and policy all offer valuable disciplinary input on matters of climate security, but the field would greatly benefit from personnel with multidisciplinary training allowing them to integrate, synthesize, and translate knowledge across domains.

Perhaps one day it will be common to have university training designed to prepare students to enter, persist, and achieve in the climate security workforce. However, based on the current landscape in higher education, with very few highly specialized interdisciplinary programs, there is a narrow pipeline of appropriately trained entry-level personnel. Furthermore, most of these specialized programs that do exist are relatively new, resulting in a shortage of mid-career personnel who are singularly trained as interdisciplinarians prepared to support this field. There are, however, mid-career personnel whose multidisciplinary expertise comes from separate and distinct training and experience within multiple disciplines, but it is difficult to match these specialists to positions due to inflexible hiring practices.

This means that the climate security sector needs to address challenges on both the supply and demand sides of human talent.

## SUPPLY SIDE - EDUCATIONAL TRENDS

There are two primary approaches by which people can become trained for these interdisciplinary roles: achieve fluency in multiple disciplines either in sequence or in parallel (multidisciplinarians); or complete an educational program that focuses on interdisciplinary studies (interdisciplinarians). Each approach carries its own strengths and weaknesses, as discussed.

Multidisciplinarians, well-versed in two or more fields, have the ability to embed themselves into multiple communities. They speak the language of each community and are likely to be seen as a trusted agent thereof. Unlike someone who is only trained as an interdisciplinarian, these multidisciplinarians are able to understand issues that penetrate the surface level; they can identify questions that a non-expert would likely miss; and they can draw on the depth of their knowledge in each area to create a more cohesive picture of the battlespace domain that resonates with each community. However, achieving fluency in multiple disciplines takes time: either years of schooling to complete multiple degrees, or years of on-the-ground experience in each community. Furthermore, while multidisciplinarians may naturally develop strong interdisciplinary communication skills, they sometimes lack formal training in communicating with those outside of their disciplines.

Conversely, interdisciplinarians are trained to leverage critical thinking skills to extract the essence of how different communities view a topic, synthesize and integrate those visions, and communicate across the disciplines and to more general stakeholders. Many interdisciplinary programs do require students to take a set number of courses within particular disciplines, but students will necessarily lack the level of depth of a dedicated disciplinarian.

Although undergraduate interdisciplinary studies programs have been around since at least the 1970s, the popularity of these programs has increased. Initially many interdisciplinary programs were watered-down dual degree programs that allowed students to build their own major, pulling from several fields. Over time, schools began to create tailored interdisciplinary programs, such as environmental studies, sustainability studies, and national security studies, which gave students more focus while still focusing on breadth across multiple disciplines versus depth within a single

discipline. More recently, universities have begun to recognize that simply being exposed to a variety of disciplines will not guarantee that students will be equipped to make those interdisciplinary connections. This has led to the recognition of interdisciplinary studies as a field in its own right, driving the top programs to include coursework that forces students to integrate and communicate across disciplines.<sup>7</sup>

In the context of climate security, there are several undergraduate and graduate programs that, while not covering the whole of the climate and security nexus, do address specific slices such as Arizona State University's Sustainability programs, George Washington University's Science & Technology Policy and Master of Arts in International Affairs Program (MAIA) programs, and Johns Hopkins University's Global Security Studies program and Energy Policy & Climate program.<sup>8,9,10</sup> Many of these programs offer flexibility that would allow students to navigate a path that provides exposure to key areas within climate security. As of 2020, there are very few internationally recognized programs that are dedicated solely to the climate security nexus, and most of these are offered through, or affiliated with, the United Nations University Institute for Environment and Human Security.<sup>11</sup> While the number of interdisciplinary programs with climate and security exposure will likely increase, so too will the number of multidisciplinary students who received targeted training in a single relevant field but have either done additional course work or gained valuable work experience in a second or even third relevant discipline. In fact, as climate security issues intensify, the field is destined to fuel growth on the supply side, as schools add and adapt programs to prepare students to enter the field, and as impassioned career changers are attracted by the urgency and complexity.

## DEMAND SIDE – HIRING PRACTICES

In contrast to the optimism expressed about the supply side of human capital, limitations on the demand side pose risks to our nation's ability to bring in appropriately trained and experienced personnel to address growing climate security-related challenges. This risk is perhaps greatest within the federal government, where hiring practices are increasingly criticized for failing to recruit a diverse and competent workforce. Specifically, the federal government's use of a human resources (HR) screening phase, in which applications are viewed by people outside of the hiring departments' purview, has been shown to exclude strong candidates over misinterpretations in qualifications when candidates do not explicitly parrot buzz words in the job opening. Another limiting practice is the use of preference points, such as veterans, military spouses, and current government civilians; while there are merits to these programs, the high point value of these preferences, relative to qualifications, has been cited as damaging to the quality and diversity of the federal workforce, particularly within the defense sector.<sup>12</sup>

Moreover, failures in diversification extend beyond race and gender; they risk limiting academic and experiential diversity, which cripples our national response in the interdisciplinary field of climate security. When hiring someone into a mid-career position, due to the arcane structure of federal job classifications, brilliant candidates with highly valuable cross-disciplinary training are unlikely to clear the initial HR screening process, as their experience is split and not concentrated. For example, a candidate who has eight years in one domain and seven in the other, will likely not be recommended for a position that requires ten years in one of the relevant domains.

Furthermore, offices may not realize the ideal skills to bring to the position. It is said that "you don't know what you don't know," and many organizations have blind spots that could be addressed with smart hires. Unfortunately, the current structure of hiring practices impedes candidates' opportunities to make their case. Offices are forced to write narrowly-defined job descriptions with clear requirements which are then harshly applied through HR screening. As a result, the applications of candidates with nontraditional training and background, whose fresh perspectives could be valuable additions to the office, are excluded from consideration.

While mid-career positions are most jeopardized, the increasing number of interdisciplinary degree programs, all with unique names, are also subject to unintentional slashing by HR screening when the degree name is not explicitly listed, or it is subjectively dismissed as not being sufficiently related to the required degree.

## CONCLUSION

A healthy employment ecosystem should offer feedback between the supply side and the demand side. When the best candidates are hired into positions, it becomes clear what makes those candidates good, and also where gaps exist in the training landscape. In this healthy ecosystem, universities respond to feedback, modifying their programs to better meet the needs of offices. However, the U.S. federal government hiring system is so broken, we do not even know what right looks like. Offices are unaware of the candidates whose applications are discarded, denying universities feedback. Exceptions exist, but the overall ecosystem is unhealthy. On the supply side, there is a growing pool of candidates with diverse training, either as interdisciplinarians or multidisciplinarians, whose expertise could advance the national response in the climate security sector. Meanwhile, on the demand side, federal hiring practices limit the ability of offices to hire the exact candidates that would best advance our national response to climate security with their diverse experiences and perspectives.

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