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Chairman Engel, Ranking Member McCaul, and distinguished Members of the Committee, thank you for the opportunity to testify before you today.

I have over 30 years of experience as a national security professional. I served as the first Deputy Undersecretary of Defense (Environmental Security). I currently serve as the Founding Board Chair of the Council on Strategic Risks (CSR) and as Senior Strategist at the Center for Climate and Security, an institute of the CSR. I also am the Founder and former Executive Director of CNA's Military Advisory Board, and Senior Fellow at the Woodrow Wilson International Center. The views I am presenting today are my own.

I would like to thank the Committee for holding this important hearing today.

In the last two sessions of Congress, the U.S. House of Representatives, on a bipartisan basis, included important provisions in the National Defense Authorization Acts (NDAA) of 2018 and 2019 on climate change, including a recognition that "climate change poses a direct threat to the national security of the United States," and those provisions have since become law. However, as former Secretary of Defense James Mattis made clear, climate change requires a "broader, whole-of government" response. It is therefore essential that progress made regarding the defense implications of climate change are reflected in our conduct of foreign affairs as well.

Let me start with a short history of how I came to determine that climate change is a national security threat, and why it is in America's national interest to understand the magnitude of this issue and the urgent need to address it.

I am the first born child of Holocaust refugees who arrived in the US in the late 1930s, among the fortunate few Jews that were able to escape Nazi Germany. Most were not so lucky, and that awareness became part of the ethos that pushed me to focus on combatting the greatest security challenges of our time. Following World War II, America's next great security challenge was the Cold War. During that era, the most important national security threat we faced was of nuclear annihilation, a "bolt out of the blue" nuclear attack by the Soviet Union. We

characterized such an attack as a "low probability, high consequence event." Fortunately, we succeeded and celebrated the end of the Cold War more than 25 years ago, when the Berlin Wall fell. At around the same time that the threat of nuclear war seemed to be diminishing, President George H.W. Bush was the first American President to acknowledge the serious implications of a changing climate for the United States.

When I served as the Deputy Undersecretary of Defense for Environmental Security in the 1990s, we were primarily focused on cleaning up hazardous waste from Cold War-era military activities. Over time, environmental issues evolved and became part of our National Security Strategy, when we began to consider the fact that conflicts over access to, or control of, natural resources compromised U.S. national security interests. The focus then was on regional cooperation between countries to reduce nuclear risks, including from nuclear waste, prevent transnational environmental crime such as overfishing and illegal logging, to promote cooperation among various stakeholders both within and outside of government, and to better understand and address the consequences of environmental threats. DoD began integrating environmental concepts into planning under its Preventive Defense Strategy, and it took on the role of "…[helping] deter or mitigate the impacts of adverse environmental actions leading to international instability."[1]

These developments at DoD, along with the implications of climate change coming into sharper focus, led to a marked increase in concerns about the security risks of climate change, from both the Department of Defense and the Intelligence Community,[2] during the George W. Bush Administration. While at CNA during that time, I founded the CNA Military Advisory Board (MAB), comprised of senior retired generals and admirals, to assess the national security implications of climate change. In 2007, we identified climate change as a "threat multiplier," in a seminal report, recognizing that climate change can exacerbate political instability, where food, water, and resource shortages already exist – often in the world's most dangerous and fragile regions. The CNA MAB in this Report stated, "[t]he potential consequences of climate change are so significant that the prudent course of action is to begin now to assess how these changes may potentially affect our national security, and what courses of action our nation should take."[3] We recommended that the national security implications of climate change be incorporated into the broad range of national security strategy and planning documents.

Building from work of the CNA MAB , the Center for Climate and Security (CCS), where I am now Senior Strategist, assembled an Advisory Board of 30 senior retired military leaders and national security professionals, who have served across both Republican and Democratic Administrations, and in all branches of the U.S. military and the U.S. Coast Guard. Since 2011, CCS has produced a steady stream of reports and articles on the national security risks of climate change, including its "Military Expert Panel" series *"Sea Level Rise and the U.S.*

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[1] Sherri Wasserman Goodman, Deputy Under Secretary of Defense, (Environmental Security), Statement Before the Subcommittee on Installation and Facilities, House Armed Services Committee, May 13, 1993.

[2] The Center for Climate and Security Resource Hub, accessed at: https://climateandsecurity.org/resources/u-s-government

[3] CNA Military Advisory Board. "National Security and the Threat of Climate Change." Report. 2007.

Military's Mission", and was the first organization to highlight the climate change dimension in Syria's political instability.[4] CCS also hosts a climate and security "community of practice," the Climate and Security Advisory Group, that includes participation from over 300 military leaders and national security leaders in the field. CSS, in partnership with the American Security Project, organized the recent letter from 58 senior military and national security leaders calling on the National Security Council to resist attempts to force our national security analysis on climate change to conform to politics. Most recently, with our partners in Europe, CCS has established an "International Military Council on Climate and Security," to meet the growing concerns about climate change from our allied and partner nation militaries.

This is all to affirm that my assessment of the security implications of climate change is neither an environmental one, nor a partisan one. It's about security. It comes from a clear-eyed consensus of our nation's leading military and national security thinkers and practitioners, and security communities worldwide, which has been built through careful analysis. My testimony today builds on this work with CCS and the CNA MAB, and the work of our national security, defense, foreign policy and intelligence agencies, who have been taking the threat of climate change seriously since 1989, across three Republican and two Democratic Administrations.

But as my Navy colleagues like to say, "Give me the BLUF – Bottom Line Up Front." So, here are mine:

1. Climate change presents an unprecedented threat to U.S. national security.
2. We possess unprecedented foresight about this threat.
3. Our foresight underlines a U.S. "Responsibility to Prepare" - essential to ensuring resilience for the future.[5]

1. Climate change presents an unprecedented threat to U.S. national security

Since we first characterized climate change as a "threat multiplier" in the 2007, the national security community has concluded that climate change now contributes to unprecedented security threats for the United States – and the world. Growing evidence demonstrates that climate change is increasing the likelihood of conflict in key regions.[6] In 2016, the Climate Security Consensus Project stated that "the effects of climate change present a strategically-significant risk to U.S. national security." In 2018, the National Defense Authorization Act, signed into law by President Trump, asserted that "climate change presents a direct threat to national security." During this Administration alone, at least 23 senior military leaders, including most recently General Scaparotti, the Supreme Allied Commander Europe, have publicly expressed serious concerns about the security threats of a changing climate. Research

[4] "Military Expert Panel Report: Sea Level Rise and the U.S. Military's Mission." Eds 1 & 2. The Center for Climate and Security. September 2016 & February 2018
[5] Werrell, Femia, Goodman, Fetzek. "A Responsibility to Prepare: Governing in an Age of Unprecedented Risk and Unprecedented Foresight." The Center for Climate and Security. August 2017
[6] Schleussner, Carl-Friedrich, Jonathan F. Donges, Reik V. Donner, and Hans Joachim Schellnhuber. "Armed-conflict Risks Enhanced by Climate-related Disasters in Ethnically Fractionalized Countries." PNAS. August 16, 2016.

supported by USAID, and published in September of last year, further demonstrates the effects of climate change on state fragility around the world. In written testimony on the Worldwide Threat Assessment in January 2019, the Director of National Intelligence, Daniel Coats, emphasized that the United States will have to manage the negative effects of a changing climate. The Director of National Intelligence has issued such concerns in 11 straight Worldwide Threat Assessments, across two Republican and one Democratic Administration.

These unprecedented changes in the climate arrive during a time of other rapid and unprecedented changes in the geostrategic environment. Population growth, rising powers, an increase in the political fortunes of authoritarians, the proliferation of weapons of mass destruction, rapid and disruptive technological change, among other major risks, are combining to challenge us in dizzying ways. The impacts of rapid climate change arrive in this already unstable and volatile world, threatening to further destabilize the world order. These unprecedented climatic changes already threaten U.S. security in two major ways:

- Emboldening our adversaries;
- Threatening military readiness.

Emboldening our adversaries

Climate change is affecting the very geostrategic landscape in which we operate, which, in turn, is heightening tensions around the world and emboldening our adversaries to exert their influence, whether that is China, Russia, or other hostile political forces and terrorist networks. These increased geostrategic tensions are especially acute in the Asia-Pacific, the Arctic, the Middle East, and Africa.

The Asia-Pacific: Increasing Risks in Disaster Alley

In a foreword to the Center for Climate and Security's 2015 report, *The U.S. Asia-Pacific Rebalance, National Security and Climate Change,* former U.S. Pacific Commander Admiral Samuel J. Locklear III, U.S. Navy (Ret) stated: "[a]s we seek to rebalance and reinvigorate our historic alliances, build new strategic and economic partnerships, and effectively posture our military in the Asia-Pacific for the 21st century, we must address the potentially catastrophic security implications of climate change in the Asia-Pacific and their likely impact on U.S. interest in the region," particularly given that this region is the "most disaster-prone area of the world."[7]

Climate change will significantly multiply this vulnerability to natural disasters in the Asia-Pacific.[8] From a security perspective, this has been confirmed by a series of regional reports

[7] Locklear, Admiral Samuel J., III, USN. "The U.S. Asia-Pacific Rebalance, National Security and Climate Change." The Center for Climate & Security. June 09, 2017.
[8] Mahfuz Ahmed and Suphachol Suphachalasai, "Assessing the Costs of Climate Change and Adaptation in South Asia," Asia Development Bank, June 2014

commissioned by the National Intelligence Council, one of which demonstrated that South and Southeast Asia face a number of security challenges driven by climate change in the next few decades, including food shortages, water crises, catastrophic flooding, greater frequency and intensity of hydro-meteorological disasters, population displacement, and increased public health issues.[9]

Nations of the region have already recognized the gravity of the threat. For example, The Council for Security Cooperation in the Asia Pacific has identified climate change as an ever-present existential threat to its members.[10] The American Security Project's "Global Security and Defense Index for Climate Change" shows that Asia-Pacific nations overwhelmingly perceive climate change as a threat to their national security.[11]

In the face of declining levels of U.S. engagement and investments that help address risks to our partners, allies and prospective allies in the Asia-Pacific, including a changing climate, nations in the region may ultimately find it more practical to accept the reality of a regionally dominant China, and the economic and political consequences of that reality. Indeed, many nations in the region, in the face of an uncertain level of U.S. engagement, have been slowly reorienting their foreign and domestic policies to accommodate an increasingly powerful Beijing, while others, such as Cambodia, seem to be hedging their bets.[12] While a number of nations in the Asia-Pacific are engaged in disputes with China over contested areas of the South China Sea, China is expanding its influence not just within the region, but beyond, to Latin America, Africa, the Arctic (as I will elaborate on in a moment), and elsewhere. China remains the largest trading partner for Southeast Asian nations, and is increasing its military force significantly in relation to other countries in its neighborhood, including through the deployment of a "blue-water navy" that has ventured as far from home as the Straits of Hormuz.[13]

In this context, the United States will need to develop more expansive approaches to maintaining and enhancing its regional influence, and supporting the interests of its allies, partners and prospective partners in the Asia-Pacific, including through robustly supporting climate resilience efforts in the region.

The Arctic: No Longer Only about Cooperation

The Arctic has emerged as a region of potential geostrategic competition, primarily because rising temperatures, melting sea ice, and collapsing permafrost now grant access to this region

[9] Southeast Asia and Pacific Islands: The Impact of Climate Change to 2030, a Commissioned Research. National Intelligence Council. August 2009.
[10] The Council for Security Cooperation in the Asia Pacific, "The Security Implications of Climate Change," June 2010
[11] Andrew Holland and Xander Vagg, "The Global Security Defense Index on Climate Change: Preliminary Results," American Security Project, March 21, 2013,
[12] Femia, Francesco, and Caitlin E. Werrell. "A Climate-Security Plan for the Asia-Pacific Rebalance: Lessons from the Marshall Plan" A Climate and Security Correlation Series, The Center for Climate and Security, November 2015.
[13] John Kemp, "In search for security, China's navy enters Strait of Hormuz," Reuters, September 22, 2014, available at http://www.reuters.com/ article/2014/09/22/china-navy-iran-kempidUSL6N0RN2FK20140922

previously locked in ice most of year. While the Arctic has historically been a region characterized by cooperation and diplomacy, it has more recently become a zone of increased tensions over valuable energy and mineral resources, and access to shipping routes. The melting of the ice sheet has given rise to exponential growth in economic and military activities, including shipping, resource extraction, and other commerce. This rapid change in the Arctic is feeding into China's and Russia's strategic ambitions, both regionally and globally.

China: As I stated in an article in Foreign Policy last year, "China has large ambitions throughout the Arctic."[14] This includes the advancement of both commercial and military objectives. For instance, China is aiming to use Russia's Northern Sea Route to gain access to European shipping opportunities. This will shorten travel times compared to traditional routes through the Straits of Malacca and Hormuz, which the U.S. controls, offering China a new strategic advantage in terms of global trade and freedom of navigation. In January 2018, this ambition was formalized in China's first public Arctic policy, wherein China declared itself to be a "near Arctic State," and articulated its intention to build a "Polar Silk Road" that will stretch from Shanghai to Hamburg, first across the Northern Sea Route, and potentially later, across the central Arctic Ocean.[15]

In the long term, China foresees using the even shorter Transpolar Sea Route across the very top of the Arctic, when that opens in several decades due to melting sea ice. This route, which might be available for several months each year, would save China from having to depend on Russian-controlled waters. As Li Zhenfu, director of Dalian Maritime University's research Center for Polar Maritime studies, noted, "[w]hoever has control over the Arctic route will control the new passage of world economics and international strategies."[16] China also is deepening its Arctic presence through foreign direct investment in several Northern European Arctic States.[17] China is exploiting current circumstances in the region to assert itself as a key partner in economic development and scientific exploration. This presence could plausibly be leveraged to influence policy in the region to be more desirable for China's long-term strategic interests.[18]

Russia: Russia also has been increasing its military presence and assertiveness in the Arctic. Its ambitions have political, military and commercial dimensions.

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[14] Goodman, Sherri, and Elisabeth Freese. "China's Ready to Cash In on a Melting Arctic." Foreign Policy. May 01, 2018. https://foreignpolicy.com/2018/05/01/chinas-ready-to-cash-in-on-a-melting-arctic/.

15 State Council Information Office of the People's Republic of China. "Full Text: China's Arctic Policy." The State Council of the People's Republic of China. January 26, 2018. http://english.gov.cn/archive/white_paper/2018/01/26/content_281476026660336.htm.

[16] Jakobson, Linda. "China Prepares for an Ice-Free Arctic." Insights on Peace and Security. March 2010. https://www.sipri.org/sites/default/files/files/insight/SIPRIInsight1002.pdf.

[17] Rosen, Mark E and Cara B. Thuringer, "Unconstrained Foreign Direct Investment: An Emerging Challenge to Arctic Security." CNA. November 2017.

[18] Goodman, Sherri and Marisol Maddox. "China's Growing Arctic Presence." China-US Focus. November 19, 2018. https://www.chinausfocus.com/finance-economy/chinas-growing-arctic-presence

On the political side, Russia has the longest Arctic coastline of any Arctic coastal state, and Russian identity has historically been tied to the Arctic. Expanding Arctic activities as ice and permafrost melts is therefore likely to enjoy broad public support.

Commercially, approximately 20 percent of Russia's Gross Domestic Product (GDP) is derived from Arctic activities, primarily energy, industrials and mining.[19] Russian President Vladimir Putin has set ambitious cargo shipping goals to monetize the Northern Sea Route by encouraging shipping from China to Europe along the Northern Sea Route, which, as the ice melts, will presumably be available for several months each year and could cut up to 15 days off the current route via the Suez Canal and the Strait of Malacca — and avoid the U.S. naval presence along those routes. It is noteworthy that President Putin recently stated that he sees the Northern Sea Route as a future "global, competitive transport artery" that is "the key to the development of the Russian Arctic and the regions of the Far East."[20]

Militarily, Russia has been exerting increasingly aggressive behavior against our High North allies, in Norway, in particular, violating their airspace and expressing hostile intent at times, including the jamming of GPS systems during recent NATO exercise Trident Juncture, and in days since, as well.[21] Russia claims its military buildup is primarily for economic reasons, presenting the Northern Sea Route as a maritime toll road through the Arctic, and seeking to monetize the route by requiring transit vessels to pay a "toll" for military escort through the shallow waters close to the Russian coastline. However, it is clear that Russia would be able to use these forces and capabilities for other purposes as well.

In short, China and Russia are expanding their power and influence in direct response to a melting Arctic, and this will have significant consequences for U.S. interests.

The Middle East and Africa: Water vulnerabilities multiply existing threats

Most countries in the Middle East and northern Africa are already considered water scarce. To put this in perspective: the U.S. would have to suffer a decrease in water supply that produces an 80 percent decrease in per capita water consumption to reach the United Nations definition of "water scarce." These projections do not factor in climate change, which is expected to

[19] Devyatkin, Pavel. "Russia's Arctic Strategy: Aimed at Conflict or Cooperation? (Part I)." The Arctic Institute. February 6, 2018. https://www.thearcticinstitute.org/russias-arctic-strategy-aimed-conflict-cooperation-part-one/.
[20] Staalesen, Atle. "It's an Order from the Kremlin: Shipping on Northern Sea Route to Reach 80 Million Tons by 2024." The Independent Barents Observer. May 15, 2018. Accessed March 25, 2019. https://thebarentsobserver.com/en/arctic/2018/05/its-order-kremlin-shipping-northern-sea-route-increase-80-million-tons-2024.
[21] Staalesen, Atle. "GPS Jamming on Agenda as Russian Defence Delegation Sat down for Talks in Oslo." The Independent Barents Observer. March 18, 2019. https://thebarentsobserver.com/en/security/2019/03/gps-jamming-agenda-russian-defence-delegation-sits-down-talks-oslo.

exacerbate water problems in many areas, particularly by reducing winter precipitation across the region (winter is when the region gets most of its water).[22]

In the Middle East and North Africa a growing body of research indicates that although environmental stressors did not "cause" the Arab uprisings of 2011, the impacts of climate change may also have served to increase the likelihood of instability in the region.[23] For example, research by my colleagues at the Center for Climate and Security observed that drought conditions in Russia and China, and subsequent global wheat shortages, contributed to higher food prices in Northern Africa and may have helped catalyze and broaden the appeal of the Egyptian uprisings in 2011. A 2012 report by the Center for Climate and Security[24] highlighted that Syria's ongoing conflict was preceded by five years of devastating drought that has since been linked to climate change, coupled with unresponsive state institutions, mismanaged natural resources, and overgrazing that decimated livestock, devastated 75 percent of crops in some regions, and forced millions to migrate to urban areas.[25] In both rural areas affected by water and land insecurity, and urban areas burdened by inadequate support systems, political turmoil increased significantly. And as Caitlin Werrell and Francesco Femia noted in 2015, we may have missed Syria's political instability in part because we were not paying attention to the climatic and environmental security dynamics at play.[26]

The last decade has also witnessed the steady rise of empowered non-state actors, from Violent Extremist Organizations (VEOs) to individual or state-sponsored hackers, and extremist political movements, powered by global communications networks. Fifty-eight military, national security, intelligence and foreign affairs leaders in a recent letter to President Trump reiterated this point, noting that water, for example, increasingly is being used as a weapon of war, "in part driven by a changing climate," by terrorist groups ranging from ISIS to Boko Haram and Al-Shabab to Al Qaeda.

For example, the rise of Al Qaeda in the Islamic Maghreb (AQIM) in Mali, which sparked significant instability across the country and region, contains a climate change signature.[27] More specifically, this situation was shaped in 2012-14 by an intersection of three salient trends: desertification and food insecurity, exacerbated by climate change; an ongoing rebellion by Tuareg nomadic herdsmen in northern Mali; and weak government institutions that could

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[22] Zappa, Giuseppe, Matthew K. Hawcroft, Len Shaffrey, Emily Black, and David J. Brayshaw. "Extratropical Cyclones and the Projected Decline of Winter Mediterranean Precipitation in the CMIP5 Models." SpringerLink. December 02, 2014.

[23] "The Arab Spring and Climate Change." The Center for Climate and Security. February 2013.

[24] Femia, Francesco and Caitlin E. Werrell. "Syria: Climate Change, Drought and Social Unrest," The Center for Climate and Security. February 2012.

[25] Kelley, Colin. "Climate Change in the Levant: Further Evidence Strengthens Case for Role in Syrian Instability." The Center for Climate & Security. March 03, 2016.

[26] Werrell, Caitlin E., Francesco Femia, and Troy Sternberg. "Did We See It Coming?: State Fragility, Climate Vulnerability, and the Uprisings in Syria and Egypt." SAIS Review of International Affairs. May 27, 2015.

[27] Femia, Francesco and Caitlin E. Werrell, "Mali: Migration, Militias, Coups and Climate Change," The Center for Climate and Security, April 2019; and The CNA Military Advisory Board, "National Security and the Accelerating Risks of Climate Change," CNA Corporation, May 2014

not address the marginalization of the Tuareg and their increasing clashes with sedentary agriculturalist tribes in the southern and central areas of the country.[28] Overwhelmed by these challenges, the fragile government was overthrown by a coup in March 2012. Following the coup, the Malian political system was unable to maintain influence in northern Mali; AQIM and other groups moved in and took control.[29]

While climate change alone did not cause the conflict, it certainly was a factor in harming the once-coexistent relationship between the Arab Tuareg and non-Arab Muslim ethnic groups in central and southern Mali. In fact, the recent Malian conflict fits a pattern of other such conflicts in Africa's Sahel region, including Darfur, South Sudan, Niger, and Nigeria. Drought and desertification have impacted the region for hundreds of years; yet climate change now is worsening these conditions across Sub-Saharan Africa, and has contributed to movement within and across borders, which can further lead to conflict dynamics in these countries that lack adequate governance and sufficiently-robust institutions to settle conflicts over vital resources. Add to this the involvement of transnational terrorist groups and militias, such as AQIM and the *Janjaweed* (in Mali and Darfur, respectively), and these conflicts become more complex, transforming resource competition into ethnopolitical conflict.

Another example of climate and resource scarcity contributing to conflict, is the conflict in Darfur between herders and farmers. Long periods of drought resulted in the loss of both farmland and grazing land to the desert. The failure of their grazing lands compelled the nomads to migrate southward in search of water and herding ground, and that, in turn, led to conflict with the farming tribes occupying those lands. Coupled with population growth, tribal, ethnic, and religious differences, the competition for land turned violent. Probably more than any other recent conflict, Darfur provides a case study of how existing marginal situations can be exacerbated beyond the tipping point by climate-related factors. It also shows how lack of essential resources threatens not only individuals and their communities but also the region and the international community at large.

Threatening military readiness

In 2017, Secretary of Defense James Mattis stated that the effects of a changing climate "impact our security situation," and that "we are prepared to address the effects of a changing climate on our threat assessments, resources, and readiness." He has been joined by 22 other senior military leaders since then in expressing such concerns.

Climate change poses threats to our military readiness due to impacts from extreme weather events and sea level rise. This has implications for our ability to project power and influence around the world, and can constrain our capacity to effectively advance our interest abroad.

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[28] Alexis Arieff, Crisis in Mali (Washington, DC: Congressional Research Service, January 14, 2013), http://www.fas.org/ sgp/crs/row/R42664.pdf

[29] Ibid

For instance, the losses at USMC Base Camp LeJeune and Tyndall AFB from Hurricanes Florence and Michael in 2018 are estimated by DOD itself to be over $3B for each base. In a January 2019 report, the Department of Defense found that about 2/3 of the 79 military installations surveyed in its review of climate vulnerabilities are already facing climate change-related risks, including recurrent flooding at 15 bases, drought exposure at 43 bases, and wildfire risk to 36 bases. Second, extreme temperatures and weather events are causing military trainings to be delayed, moved, and otherwise complicated. Third, America's coastal regions, from the Arctic to the Gulf coast are rapidly changing, forcing communities in both Alaska and Louisiana to be among America's first communities facing relocation, due to changing climate conditions. Needing the National Guard to respond with humanitarian-type assistance in areas at home and around the world also is straining our military resources and readiness.

A 2018 report from the Center for Climate and Security's Military Expert Panel, found that:

"… over the course of the remainder of the 21st century, the U.S. military's domestic and international coastal military installations face significant risks from climate-driven changes in the environment, namely sea level rise and its interaction with an increased frequency and intensity of extreme weather events."[30]

This report also concluded that policies and plans for addressing these risks will need to reach beyond infrastructure resilience. The effects of a changing climate present operational and strategic risks that have significant implications for foreign policy, and these broader implications require more analysis, planning, and prevention.

For example, the report found that the Ronald Reagan Ballistic Missile Defense Test Site, based in the Kwajalein Atoll and extending into nearly 700,000 square miles of surrounding ocean, is significantly exposed to sea level rise, both in terms of inundation and the threat to freshwater resources. Given that the site is a key DoD asset for testing missile and missile defense systems and conducting work for U.S. Strategic Command, NASA, and other agencies, threats to the installation can have a significant impact on the U.S. ability to monitor and manage threats in the Asia-Pacific region, including North Korea, and projecting power and influence. Kwajalein also hosts the new billion dollar "Space Fence" radar system and operations center that contributes to space situational awareness for U.S. forces.119 At Kwajalein, as described by The Washington Post, "the United States can practice launching or deflecting nuclear attacks, provide a territorial bulwark against China, immediately detect any launches out of Asia, and provide a rocket-launch apparatus to civilian companies such as SpaceX."[31]

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[30] "Military Expert Panel Report. Sea Level Rise and the U.S. Military's Mission." The Center for Climate and Security. February 2018.

[31] Zak, Dan. "A Ground Zero Forgotten: Once a Nuclear Test Site, Islands Face Oblivion Again. (Marshall Islands)." The Washington Post. November 27, 2015. https://www.washingtonpost.com/sf/national/2015/11/27/a-ground-zero-forgotten/?utm_term=.4aed53c4bf21.

Direct threats to such assets via climate change-related events can hamper both our national security and foreign policy objectives.

2. We possess unprecedented foresight about this threat

The silver lining is that in the face of these unprecedented, high-consequence threats, we also have unprecedented knowledge, foresight, and predictive tools and capabilities across multiple fields from diplomacy to intelligence, defense, and beyond. This is reflected in Director of National Intelligence Coats' above-mentioned written statement on the WorldWide Threat Assessment, in which he states that "[g]lobal environmental and ecological degradation, as well as climate change, are likely to fuel competition for resources, economic distress, and social discontent through 2019 and beyond."[32] Indeed, the last eleven Worldwide Threat Assessments issued by the Director of National Intelligence have included climate change threats. This reflects a growing technological ability to identify both the physical and social changes being driven by a changing climate.

Technological developments, including quantum computing, 5G, artificial intelligence, data analytics, and more, are further increasing our capacity to forecast, predict, and plan for these risks, from food scarcity to water shortages and beyond. In the field of predicting state instability, for example, three different tools utilized by the U.S. government - Fuzzy Analysis of Statistical Evidence (FASE—US Army), Integrated Crisis Early Warning System (ICEWS—US Army) and the Political Instability Task Force (PITF—CIA) have by one measure been assigned a success rate of 80%.[33]

However, prediction is not the same as preparedness. To enhance preparedness, we also need committed, well-resourced institutions regularly delivering and translating climate information to decision-makers, and having such information better integrated into the tools for predicting state fragility or conflict. We also need entities dedicated to interpreting climate-related risks and issuing warnings to decision-makers in a systematic and compelling way, because, otherwise, governments and intergovernmental institutions will continue to be underprepared for these risks. To effectively address these threats, we must break down traditional agency and departmental siloes, as well. We must turn foresight into action.

3. Our foresight underscores a U.S. "Responsibility to Prepare" – essential to ensuring resilience for the future

Given the magnitude and scope of this threat, there is urgent need to act now, before we face even greater security-related threats from climate change. Thus, climate factors should be incorporated across the "3D's" of diplomacy, development, and defense and into security-related strategic planning efforts at the front end. As I and my colleagues stated in 2017, the

[32] Coats, Daniel R. *Worldwide Threat Assessment of the US Intelligence Community.* Report. February 13, 2019.
[33] J. Eli Margolis, 'Estimating State Instability,' Studies in Intelligence, Volume 59, Number 1, March 2012, pp. 13-24.

unprecedented threat of climate change, coupled with the unprecedented foresight we are able to marshal today, underscores a "Responsibility to Prepare" for climate change. We presented the "Responsibility to Prepare" Framework to the UN Security Council in late 2017, and many of its principles are beginning to be adopted. The complex, transnational, and cross-sectoral nature of climate threats demand such a comprehensive approach.

The essence of the Responsibility to Prepare is to ensure that the U.S., as well as its partners and allies, is able to withstand climatic stresses through a series of steps designed to enhance resilience: mainstreaming, integrating, institutionalizing, and elevating attention to climate and security issues across the government, as well as developing rapid response mechanisms for addressing the threat.

Mainstreaming: Climate change is happening now, and affects nearly all aspects of society, yet that reality is not reflected in the day to day routine activities of government bodies responsible for foreign affairs and security. Mainstreaming attention to climate change across our foreign affairs and national security apparatus could range from providing regular intelligence briefings on the subject to key decision-makers in our government, to supporting regular dialogues and forums on the subject, in the U.S., and at the UN, particularly in the UN Security Council (UNSC).

Institutionalization: How climate change impacts security is not deeply understood within and across governments. In this context, the issue requires institutional centers to conduct climate security analysis and inform decision-makers. Institutionalizing attention to the issue is also important for closely monitoring slow-onset stresses related to climate change that could gradually erode state stability and might be more difficult to detect than more dramatic or episodic changes. Establishing a "Climate Security Crisis Watch Center," for example, staffed by expert climate, national security, foreign affairs, and intelligence analysts, that could issue recommendations for action to the U.S. Government, could ensure that the United States is more prepared for both slow- and quick-onset climatic changes affecting security.

Elevation: In some cases, warnings related to nontraditional security risks are delivered to governments by analysts, but not at a senior enough level within an agency or department that appropriately contextualizes the risks as they pertain to other strategic priorities. In this context, elevating such issues within the US government, for example, establishing a senior Climate Change and Security position, either within the State Department or another appropriate agency, would go a long way toward ensuring that these issues were received and addressed at the highest levels. Such an individual could be responsible for overseeing the work of the aforementioned Climate and Security Crisis Watch Center and delivering recommendations within and across the USG and beyond, as appropriate.

Integration: The US government should integrate climate change trends into its analyses of other critical security and foreign policy priorities. This is the "just add climate" approach, justified by the nature of the threat and the fact that changes in the climate, acting as a threat multiplier, will affect the entire geostrategic landscape. For example, the questions of how climate change intersects with health security, conflict, international terrorism, nuclear

proliferation, and maritime security, are all critically important, but may be missed if such analysis is contained only within the specialized centers mentioned above. Practically, this could involve embedding climate and security analysts across issue siloes within the US government, or creating interagency structures to facilitate such integration.

Rapid response: Though the approaches above are designed to facilitate preparedness and prevention, rapid response measures could help, particularly for anticipating low probability/high impact risks, and creating a governance capacity to prepare for "unknown unknowns" or "black swans."[34] The aforementioned Climate Security Crisis Watch Center, for example, could employ such a rapid response system when communicating with leadership across the US Government.

Leadership on climate security is an essential element of advancing America's interests in the 21st century.

The globally devastating Second World War precipitated the creation of an international system, led by the United States, designed to protect the sovereignty of states against external aggression and decrease the likelihood of conflict between nations. This is the world order we are trying to preserve today. However, the rapid rate of climatic change, combined with other global threats, and the increasing stress on security that follows means that this system must adapt, and adapt quickly. The U.S. should lead that effort, just as it led the effort to ensure global stability after the Second World War.

Military leaders are trained to examine a range of risk estimates and to prepare plans to reduce that risk, in the first instance, or defend against it. The military "does not see the range of possibilities as justification for inaction." We need to apply these risk management concepts to climate change. As General Gordon Sullivan, USA (Ret.), former Army Chief of Staff, stated about responding to climate change, "[b]ack in the [Cold War], the challenge was to stop a particular action [(i.e., a nuclear attack)]. Now, the challenge is to inspire a particular action."[35]

Fortunately, the difference between today and major global disruptions of the past is that we can spot impending disasters earlier and more easily. Though the risks are unprecedented, our foresight is unprecedented as well. Technological developments have given us predictive tools that enhance our ability to anticipate and mitigate threats. In short, we have the ability to make our communities, institutions and individuals more resilient to a broad range threats. This foresight underscores a responsibility to advance resilient solutions that are commensurate to the threat. I call that a "Responsibility to Prepare." Leadership on incorporating climate threats across the "3D's" of diplomacy, development, and defense, and into security-related strategic planning efforts, is essential to protect America's 21st-century near- and long-term national

[34] Femia, Francesco, Christine Parthemore, Caitlin Werrell. "The inadequate US response to a major security threat: Climate change," *The Bulletin of the Atomic Scientists*, July 20, 2011

[35] CNA Military Advisory Board. "National Security and the Threat of Climate Change." Report. 2007.

security interests. If we don’t, we’ll either have to watch our adversaries take the lead, or failing that, bear witness to an increasingly unstable world.