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HOW CLIMATE CHANGE THREATENS U.S. NATIONAL SECURITY

HEARING

BEFORE THE

COMMITTEE ON FOREIGN AFFAIRS
HOUSE OF REPRESENTATIVES

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CONTENTS

Page

ASP LETTER

ASP Letter submitted from Chairman Engel 3

WITNESSES

McGinn, Vice Admiral USN (Ret) Dennis V., Former Assistant Secretary of the Navy for Energy, Installations, and Environment 10
Goodman, Hon. Sherri, Former Deputy Undersecretary of Defense for Environmental Security 18
Weisenfeld, Paul, Executive Vice President, International Development, RTI International, Former Assistant to the Administrator for the Bureau of Food Security, U.S. Agency for International Development 34
Worthington, Barry K., Executive Director, United States Energy Association 45

ARTICLES SUBMITTED FOR THE RECORD

The Guardian article submitted for the Record from Representative Lieu 71
Climate Change article submitted for the Record from Representative Lieu 74
The Military Paid article submitted for the Record from Representative Lieu . 80
CNN article submitted for the Record from Representative Omar 94

APPENDIX

Hearing Notice 102
Hearing Minutes 103
Hearing Attendance 104

ADDITIONAL INFORMATION SUBMITTED FOR THE RECORD

Information from Conservation International submitted for the Record from Chairman Engel 105
Statement for the Record submitted from Representative Connolly 110

RESPONSES TO QUESTIONS SUBMITTED FOR THE RECORD

Responses to questions submitted from Representative Sires 112
Responses to questions submitted from Representative Smith 120

HOW CLIMATE CHANGE THREATENS U.S. NATIONAL SECURITY

Tuesday, April 2, 2019

HOUSE OF REPRESENTATIVES
COMMITTEE ON FOREIGN AFFAIRS
Washington, DC

The committee met, pursuant to notice, at 10:03 a.m., in Room 2172 Rayburn House Office Building, Hon. William Keating presiding.

Mr. KEATING. The committee will come to order.

Without objection, all members may have 5 days to submit statements, questions, and extraneous materials for the record, subject to the length limitation in the rules.

This morning the committee will examine the national and international security implications of climate change. I would like to welcome our witnesses and welcome members of the public and the press as well. I will just give a brief opening remark I shared with the chairman of the committee, Mr. Engel, who will be here momentarily, but in convenience to the witnesses and members we will begin now.

I will be doing this because our committee and our subcommittee deals with global environmental issues and foreign affairs. So let me begin with the shared remarks that I had with the chairman.

Now, the national security concerns tied to climate change are nothing new to the U.S. Government. In fact, government researchers across disciplines and across administrations of both parties have been taking a hard look at this challenge for decades. It was all the way back in 1988 that the Intergovernmental Panel on Climate Change was established. In 2003, the Pentagon commissioned a report to examine how an abrupt change in climate would affect our defense capabilities.

Its authors concluded that it should be evaluated beyond the scientific debate to a U.S. national security concern. It was uplifted to that level.

More recently, in 2012 and 2014, the Department of Defense Climate Change Adaption Roadmap stated that climate, climate change can serve as "an accelerant of instability or conflict." That could have a significant geopolitical impact and contribute to poverty, environmental degradation, the weakening of fragile governments, and food and water scarcity.

In December 2017, the GOP-led Congress passed a defense bill that was signed into law with language stating that "climate change is a direct threat to our national security of the United States.

And just this past January, the National Intelligence Director delivered a worldwide threat assessment that "climate hazards" include extreme weather, wildfires, drought, acidification of the oceans, threatening infrastructure, health, water and food security.

Now, what are the real world implications of all these assessments and warnings? What does our warming global—our warming globe actually look like?

Intensifying food and water insecurity.

Population flows related to migration.

Displacement and planned relocation.

The inability of fragile States to anticipate and mitigate the impacts of climate change.

Increased need for disaster relief and humanitarian assistance.

Great Power competition resulting from the diminishment of Arctic sea ice and heightened conflict with and among States.

These are problems that would generally demand the full focus of American foreign policy. You would think that getting at the root cause of such an alarming list of issues would be a major priority. The rest of the world thinks so. Every other country on this planet is party or signatory to the Paris Agreement aimed at curbing the greenhouse gases that drive climate change.

The only country to announce its intention to walk away from that deal is, of course, the United States. To justify this misguided decision, the White House recently allowed—announced plans to create an ad hoc group of select scientists to reassess the government's analysis of climate science. After years and years of Federal research that makes clear, makes a clear and strong case that climate change is a serious threat, the Trump administration is now desperately seeking to undermine the conclusions that the continued burning of fossil fuels is harming the planet and putting our Nation's security at risk. It is just astounding. It is bizarre.

It is rare to see every country in the world rally around an issue, but there is one idea that just about everyone is aboard on: it is absolutely imperative that we grapple with the challenge of climate change. That the future or our very world, and American national security, depends on the actions that we take today, that we owe to future generations so that we do not turn our back on the tide, and we prevent that list of horrible consequences.

Just about everyone, that is except certain members of one party in the United States, feels that way. And as a result of this small cabal with their heads planted firmly in the sand, the United States has rejected the clear science, ignored the growing threat, and walked away from its role as a global leader on this issue. I cannot help but wonder, 30, or 50, or 100 years down the road when people look back at this era what they will be saying about the way the United States dealt with this problem. I do not think it will be very kind.

I am entering into the record a letter signed by 58 former senior military and intelligence officials to the president warning him that imposing a political test on reports issued by the science agencies and forcing a blind spot onto the national security assessments that depend on them will erode our national security. It is dangerous to have national security analysis conform to politics.

[The information referred to follows:]

ASP American Security Project — THE CENTER FOR CLIMATE AND SECURITY

March 5, 2019

Dear Mr. President:

We write to you as former US national security leaders to offer our support to our uniformed military, civilian national security professionals, and members of the scientific community, who across the past four Administrations have found that climate change is a threat to US national security.

Climate change is real, it is happening now, it is driven by humans, and it is accelerating. The overwhelming majority of scientists agree: less than 0.2% of peer-reviewed climate science papers dispute these facts. In this context, we are deeply concerned by reports that National Security Council officials are considering forming a committee to dispute and undermine military and intelligence judgments on the threat posed by climate change. This includes second-guessing the scientific sources used to assess the threat, such as the rigorously peer-reviewed National Climate Assessment, and applying that to national security policy. Imposing a political test on reports issued by the science agencies, and forcing a blind spot onto the national security assessments that depend on them, will erode our national security.

It is dangerous to have national security analysis conform to politics. Our officials' job is to ensure that we are prepared for current threats and future contingencies. We cannot do that if the scientific studies that inform our threat assessments are undermined. Our national security community will not remain the best in the world if it cannot make decisions based on the best available evidence.

When extreme weather hits the United States, it degrades the fighting force. Just last year, Hurricane Florence caused $3.6 billion in damages to Camp Lejeune, home of the Marines' expeditionary units on the East Coast. You called Florence "One of the biggest to ever hit our country." Stronger storms and storm surges have long featured in predictions about a changing climate. Around the world, climate change is a "threat multiplier" – making other security threats worse. Its effects are even used by our adversaries as a weapon of war; ISIS used water shortages in Iraq, in part driven by a changing climate, to cement their hold on the population during their reign of terror from 2014 to 2017.

We support the science-driven patriots in our national security community who have rightly seen addressing climate change as a threat reduction issue, not a political one, since 1989. We support the bipartisan finding of the US Congress, which you signed into law on December 2017, stating that *"climate change is a direct threat to the national security of the United States."* We urge you to trust and heed the analysis of your own national security agencies and the science agencies on which their assessments depend, including the 21 senior defense officials that have identified climate change as a security threat during your Administration. A committee designed to undermine the many years of work they have done will weaken our ability to respond to real threats, putting American lives at risk.

Our climate will continue to change, and the threats will continue to grow. We spent our careers pledged to protect the United States from all threats, including this one. Let's drop the politics, and allow our national security and science agencies to do their jobs.

Sincerely,

ASP American Security Project | THE CENTER FOR CLIMATE AND SECURITY

Hon. John Kerry
Former Secretary of State

Hon. Ray Mabus
Former Secretary of the Navy

General Gordon R. Sullivan, US Army (Ret)
Former Chief of Staff of the US Army

Admiral Samuel J. Locklear III, USN (Ret)
Former Commander, US Pacific Command

Admiral James Stavridis, USN (Ret)
Former Supreme Allied Commander Europe

Nancy Soderberg
Former Deputy Assistant to the President for National Security Affairs

Hon. Sharon Burke
Former Assistant Secretary of Defense for Operational Energy

Hon. David Goldwyn
Former Assistant Secretary of Energy and Special Envoy for International Energy Affairs

Hon. Miranda AA Ballentine
Former Assistant Secretary of the Air Force (Installations, Environment, and Energy)

Leon Fuerth
Former National Security Adviser to the Vice President

Dr. Geoffrey Kemp
Former Special Assistant to the President for National Security Affairs

General Paul Kern, USA (Ret.)
Former Commanding General, US Army Materiel Command

Lieutenant General John Castellaw, USMC (Ret)
Former Chief of Staff, US Central Command

Lieutenant General Arlen D. Jameson, USAF (Ret)
Former Deputy Commander, US Strategic Command

Lieutenant General Norm Seip, USAF (Ret)
Former Commander, 12th Air Force

Hon. Sherri Goodman
Former Deputy Under Secretary of Defense (Environmental Security)

Hon. Chuck Hagel
Former Secretary of Defense

Vice Admiral Richard Truly, USN (Ret)
Former Administrator of NASA

Admiral Paul Zukunft, USCG (Ret)
Former Commandant of the Coast Guard

General Stanley McChrystal, USA (Ret)
Former Commander, US and International Security

Lieutenant General Donald Kerrick, USA (Ret)
Former Deputy National Security Advisor to the President of the United States

Tom Hicks
Former Acting Under Secretary of the Navy and Deputy Under Secretary of the Navy for Management

Hon. John Conger
Former Principal Deputy Under Secretary of Defense (Comptroller) and Assistant Secretary of Defense for Energy, Installations and Environment

Eric Rosenbach
Former Chief of Staff, Department of Defense, and Assistant Secretary of Defense for Global Security

Vice Admiral Dennis McGinn, USN (Ret)
Former Assistant Secretary of the Navy for Energy, Installations and Environment

Hon. Alice Hill
Former Special Assistant to the President and Senior Director for Resilience Policy, National Security Council

Major General Randy Manner, USA (Ret)
Former Acting Vice Chief, National Guard Bureau

General Ron Keys, USAF (Ret)
Former Commander, Air Combat Command

Vice Admiral Philip Cullom, USN (Ret)
Former Deputy Chief of Naval Operations, Fleet Readiness and Logistics

Lieutenant General Kenneth E. Eickmann, USAF (Ret)
Former Commander, Aeronautical Systems Center, Headquarters Air Force Materiel Command

Vice Admiral Robert C. Parker, USCG (Ret)
Commander, Coast Guard Atlantic Area

ASP American Security Project | THE CENTER FOR CLIMATE AND SECURITY

Greg Treverton
Former Chair, National Intelligence Council

Major General Jerry Harrison, USA (Ret)
Former Chief, Office of Legislative Liaison, Army Staff

Rear Admiral Leendert R. Hering USN (Ret)
Former Commander, Navy Region Southwest

Major General Jeff Phillips, USA (Ret)
Executive Director, Reserve Officers Association

Rear Admiral Michael Smith, USN (Ret)
Former Commander, Carrier Strike Group 3

Rear Admiral Jonathan White, USN (Ret)
Former Oceanographer & Navigator, US Navy

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Former Acting Deputy Assistant Secretary of the Navy (Energy)

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Former Commander, Special Operations Command-Africa

Brigadier General Robert Felderman, USA (Ret)
Former Deputy Director of Plans, Policy and Strategy, United States Northern Command and North American Aerospace Defense Command

Brigadier General Carlos Martinez, USAF (Ret)
Former Mobilization Assistant, Chief of Warfighting Integration and Chief Information Officer, Office of the Secretary of the Air Force

Joan VanDervort
Former Deputy Director, Ranges, Sea, and Airspace, Office of the Deputy Assistant Secretary of Defense (Readiness)

Commander David Slayton, USN (Ret)
Executive Director, the Arctic Security Initiative The Hoover Institution

Hon. Richard Morningstar
Former Ambassador to the European Union

Major General Richard T. Devereaux, USAF (Ret)
Former Director, Operational Planning, Policy and Strategy, Headquarters US Air Force

Rear Admiral Sinclair M. Harris, USN (Ret)
Former Commander, United States Fourth Fleet

Rear Admiral Michael G. Mathis, USN (Ret)
Chief Engineer to the Assistant Secretary of the Navy (Research, Development and Acquisition)

Rear Admiral Fernandez L. Ponds, USN (Ret)
Commander, Expeditionary Strike Group (ESG) 3

Rear Admiral Kevin Slates, USN (Ret)
Former Director of Energy and Environmental Readiness Division, US Navy

Rear Admiral David W. Titley, USN (Ret)
Former Oceanographer & Navigator, US Navy

Joe Bryan
Former Deputy Assistant Secretary of the Navy (Energy)

Brigadier General John Adams, USA (Ret)
Former Deputy United States Military Representative to the North Atlantic Treaty Organization Military Committee

Brigadier General Joseph R. Barnes, USA (Ret)
Former Assistant Judge Advocate General of the Army

Brigadier General Stephen Cheney, USMC (Ret)
Former Commanding General Marine Corps Recruit Depot, Parris Island

Brigadier General Gerald E. Galloway, USA (Ret)
Former Dean of the Academic Board, US Military Academy, West Point

Brigadier General Stephen Xenakis, USA (Ret)
Former Commanding General, Southeast Regional Medical Command

Colonel Lawrence B. Wilkerson, USA (Ret)
Former Chief of Staff to the US Secretary of State

Mr. KEATING. Two of those officials, Admiral Dennis McGinn and Deputy Undersecretary Sherri Goodman, are here with us today, with Sherri having connections right to my district in Cape Cod. I look forward to their testimony and that of Mr. Weisenfeld and Mr. Worthington. I will soon introduce them.

But we will first yield to our ranking member, Mr. McCaul of Texas, for any opening remarks that he might have.

Mr. MCCAUL. Thank you, Mr. Chairman.

Last year I was briefed by the head of sciences at NASA to discuss this important issue. And the national security assessments are clear, climate change poses risks to the security of the United States and the international community. The best way to address climate change, however, is less clear.

President Obama's approach was to set unrealistic greenhouse gas reduction targets within the framework of the Paris Agreement that would have cost our economy a fortune, hurting working people living paycheck to paycheck. When President Trump announced his intention to withdraw from the Paris Agreement he also expressed an openness to reentering or renegotiating the deal on terms more favorable to the United States.

I look forward to hearing from our witnesses about their recommendations for a way forward that appropriately balances the very real need to reduce greenhouse gas emissions in the United States and around the globe, especially in China, the world's No. 1 emitter, with the need for economic growth and a reliable affordable supply of energy.

I come from one of the top energy-producing States in the largest oil and gas producing nation in the world. Our abundant national resources, including fossil fuels which product 80 percent of the world's energy, not only support our economy and good-paying jobs, but they make us more secure as a Nation.

Mr. Chairman, the committee is not in order.

Mr. KEATING. The ranking member is correct. The committee members will withhold their conversations to the empty room if they would have them.

The chair recognizes the ranking member.

Mr. MCCAUL. And I thank the chairman for that.

We are fortunate that we do not depend on an energy supplier like Russia that uses its dominance in European gas markets to coerce and intimidate its neighbors. We are no longer at the mercy of the OPEC cartel for the majority of our oil needs. Instead, thanks to innovation and technology we have become a net energy exporter that offers our partners and allies a stable, reliable supply of energy resources.

We have also been able to hold down prices for consumers, which contributes to domestic and global economic growth and prosperity. Many energy companies are taking great steps to shift to cleaner sources to reduce greenhouse gas emissions. This is taking place not necessarily because of government policy but despite it.

From 2005 to 2017, U.S. greenhouse gas emissions declined by 14 percent. In 2017, U.S. greenhouse gas emissions were the lowest since 1992. China and India accounted for nearly half of the increase in global carbon emissions in 2017. And developing country emissions will continue to rise to the point that all of the United

States and Europe's emissions will soon be far surpassed by other economies.

I have witnessed firsthand the devastation brought to families in my State and district from flooding and extreme weather events like Hurricane Harvey. The recovery efforts are ongoing, and the impact will last well into the future. As the world's largest economy and preeminent power, the United States has a responsibility to help lead global efforts to address climate change based on realistic solutions as opposed to extreme unrealistic goals based on aspiration alone.

With that, I look forward to the testimony of the witnesses and on how we can achieve that goal.

And with that, Mr. Chairman, I yield back.

Mr. KEATING. The chair thanks the ranking member.

Now I will have the opportunity to give a brief introduction to our witnesses who we are grateful for their presence here today. Thank you very much for taking the time to come.

Vice Admiral Dennis McGinn served as Assistant Secretary of the Navy for Energy, Installations, and Environment from September 2013 until January 2017. Prior to that he served on active duty in the United States Navy for 35 years as a naval aviator, test pilot, aircraft carrier commanding officer, and national security strategist.

As vice admiral he was Deputy Chief of Naval Operations and Commander of the United States Third Fleet.

Admiral, thank you for being here and thank you for your service.

Sherri Goodman is Senior Strategist at the Center for Climate Security, a member of its advisory board, and chair of the Board of the Council on Strategic Risks. She is also a Senior Fellow with the Woodrow Wilson Center. Prior to this, she was CEO and President of the Ocean Leadership Consortium, and Senior Vice President, General Counsel, and Corporate Secretary of CNA.

From 1993 to 2001, Ms. Goodman served as Deputy Undersecretary of Defense and Environmental Security, the chief environmental, safety, and occupational health officer for the Department of Defense.

Ms. Goodman, thank you for being here.

Paul Weisenfield—Weisenfeld, I apologize, is Executive Vice President for International Development at RTI International, an independent, nonprofit research institution. He leads RTI's international development practice which designs and implements programs across a wide range of sectors to help lower and middle-income countries and communities address complex problems and improve the lives of their citizens.

He earlier served as a foreign officer at USAID, leading high profile initiatives across various international development sectors.

Thank you very much for being here. I know that the chairman will be pleased. You have met him in the past, and I am sure he will mention that.

Last but not least, Barry Worthington is an Executive Director of the United States Energy Association, a U.S. member committee of the World Energy Council, and an advisory organization that represents 150 members across the American energy sector. He

represents the broad interests of our country's energy industry, working to develop energy infrastructure projects around the world. He chairs the Clean Energy Production Working Group within the United Nations' Economic Commission for Europe, Committee on Sustainable Energy.

Welcome again to all of you. Thank you for your time and expertise. And I will now recognize you for 5 minutes each to summarize your testimony. Let's start with Admiral McGinn.

STATEMENT OF VICE ADMIRAL DENNIS V. MCGINN, USN (RET), FORMER ASSISTANT SECRETARY OF THE NAVY FOR ENERGY, INSTALLATIONS, AND ENVIRONMENT

Mr. MCGINN. Mr. Keating, Ranking Member McCaul, distinguished members of the committee, thank you for the opportunity to testify today on the critical impact of climate change on our national security. My views are based on over 35 years of military service to our Nation in the United States Navy, as a former Assistant Secretary of the Navy for Energy, Installations, and Environment and, presently, as a senior executive intimately familiar with the issues of energy, the economy and our environment.

As we start the conversation today I want to note that there are many ways that climate change threatens U.S. national security that are not the primary focus of this hearing. Those are the direct impacts on military bases and military readiness from recurring flooding at Norfolk Naval Shipyard, to the impacts of record rainfall and flooding at Camp Lejeune, to the evacuation of Naval Air Station Point Mugu as the Hill Fire approached the base.

Climate change is already impacting our military installation readiness right here at home, and will to an even greater extent in the future. Today, however, our focus is on global threats and how changes in the climate will drive instability and, increasingly, create adverse geopolitical outcomes around the world.

To set the stage, it is helpful to view some of these threats the way our senior military leaders do.

First, they see more sources of conflict to which our forces may have to respond. The conflict may involve internal strife due to mismanagement of increasingly limited natural resources, or economic displacement. Or it may be conflict between States competing for limited water or food resources. We are increasingly seeing the prospect of conflict driven by control of rivers and the possibility of one nation trying to limit water to another.

Second, they see climate-driven unemployment, displacement, migration, and despair, creating a pool of prospective recruits for violent extremist organizations. When a young generation has few prospects and seemingly nothing left to lose, terrorist organizations claim to offer them a way out.

Third, our senior military leaders see the prospect to increase tensions in the Arctic. As the ice melts, as trade routes open up, and as more resources become accessible, we see both Russia and China moving to exert military and economic control over the high north.

Fourth, our military leaders see a greatly increased and more frequent need to respond to humanitarian crises and natural disasters, especially in the Pacific and the Caribbean. These storms are

devastating. They are deadly and they leave behind wreckage that can take years and, in some cases, generations to recover.

So, clearly, the first step in combating the national security impacts of climate change are to recognize that we are already dealing with them.

The next crucial step is to understand the serious implications for our future national security environment. We cannot now, nor as future challenges bear down on us, treat any of this as a surprise. We have a responsibility, therefore, to prepare for the changes we see coming, to lead and help shape the global environment to protect American interests in our national security. Current and future generations of our service members and, indeed, all Americans deserve our very best efforts.

With that, Mr. Chairman, I would like to submit a more detailed statement for the record.

[The prepared statement of Mr. McGinn follows:]

VADM Dennis McGinn, USN, Retired
Member, Advisory Board, The Center for Climate & Security
Former Assistant Secretary of the Navy for Energy, Installations and Environment

Statement to the United States House of Representatives
Committee on Foreign Affairs
"How Climate Change Threatens U.S. National Security"
2 April 2019

Thank you, Chairman Engel, Ranking Member McCaul, and distinguished Members of the Committee, for the opportunity to testify today on the critical impact of climate change on national security. My views are based on over thirty-five years of uniformed service to our Nation in the United States Navy, as a former Assistant Secretary of the Navy for Energy, Installations and Environment, and as a senior executive deeply familiar with issues of energy, the environment and their impact on our economy.

I understand that today the committee is focused on the threats posed by climate change, and I will, as well. But I also want to emphasize the criticality of American leadership on the global stage and the essential role our nation must play if the world is to meet this challenge.

With respect to the current Administration, let me begin by citing a few of its highly respected national security officials and military officers:

The Director of National Intelligence and former Republican Senator Dan Coats delivered a Worldwide Threats Assessment this year that asserted: *"Global 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. Climate hazards such as extreme weather, higher temperatures, droughts, floods, wildfires, storms, sea level rise, soil degradation, and acidifying oceans are intensifying, threatening infrastructure, health, and water and food security. Irreversible damage to ecosystems and habitats will undermine the economic benefits they provide, worsened by air, soil, water, and marine pollution."*

The current Chairman of the Joint Chiefs, General Dunford said recently, "*When I look at climate change, it's in the category of sources of conflict around the world and things we have to respond to. So it can be great devastation requiring humanitarian assistance/ disaster relief, which the U.S. military certainly conducts routinely. In fact, I can't think of a year since I've been on active duty that we haven't conducted at least one operation in the Pacific along those lines due to extreme weather in the Pacific. And then, when you look at source of conflict – shortages of water, and those kind of things – those are all sources of conflict. So, it is very much something that we take into account in our planning as we anticipate when, where and how we may be engaged in the future and what capabilities we should have."*

Finally, former Secretary of Defense Jim Mattis stated that "the *effects of a changing climate — such as increased maritime access to the Arctic, rising sea levels, desertification, among others — impact our security situation." He added, "Climate change can be a driver of instability and the Department of Defense must pay attention to potential adverse impacts generated by this phenomenon,"* adding that *"...climate change is impacting stability in areas of the world where our troops are operating today."*

In his mind, this is more than just a Department of Defense challenge. He noted that *"climate change is a challenge that requires a broader, whole-of government response."* I wholeheartedly agree and believe this committee has an important role to play in ensuring it gets the whole-of-government response it deserves.

These distinguished leaders have taken a solemn oath to protect the nation. They are great and patriotic Americans providing their deeply experienced opinions on the implications of a serious global security issue.

In that light, I was deeply concerned when media reports indicated that members of the National Security Council staff were seeking to establish a panel to conduct adversarial reviews of such military and intelligence professionals and their well-researched assessments that clearly point to the national security implications of climate change.[1] I was proud to join 57 colleagues – former military and national security professionals – in urging the President to reject this proposal. Our letter stated:

"...we are deeply concerned by reports that National Security Council officials are considering forming a committee to dispute and undermine military and intelligence judgments on the threat posed by climate change. This includes second-guessing the scientific sources used to assess the threat, such as the rigorously peer-reviewed National Climate Assessment, and applying that to national security policy. Imposing a political test on reports issued by the science agencies, and forcing a blind spot onto the national security assessments that depend on them, will erode our national security."[2]

In the past year, military commanders have testified to Congress about the impacts of climate change. The Commander of EUCOM pointed to the High North as the Arctic ice recedes.[3] He has updated his plans as China moves to exert influence and Russia has begun to move weapons systems into the region to exert influence over the new Northern trade route. The Commander of INDOPACOM spoke about the demands on U.S. forces responding to extreme weather events in the Pacific. The Commander of

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[1] Eilperin, Juliet and Missy Ryan. "White House readies panel to assess if climate change poses a national security threat." The Washington Post. February 20, 2019

[2] "Letter to the President of the United States." The Center for Climate and Security and the American Security Project. March 5, 2019. Accessed at: www.climateandsecurity.org/letter-to-the-president-of-the-united-states-nsc-climate-panel/

[3] General Curtis M. Scaparrotti, USA. Oral Testimony on United States European Command in review of the Defense Authorization Request for Fiscal Year 2020 and the Future Years Defense Program. U.S. Senate Committee on Armed Services. March 5, 2019.

Africa Command noted the shrinking of the Sahel and his observation that we will see increased conflict over shrinking resources.[4]

As military professionals, we were trained to make decisions in situations sometimes defined by ambiguous information and little concrete knowledge of the enemy intent. We based our decisions on trends, experience, and judgment, because waiting for 100% certainty during a crisis can be disastrous, especially one with the huge national security consequences of climate change. In this case, however, the information, analysis and trends about climate change are clear. Observable climate data and scientific metrics continue to show that the global environment is changing. Even for those few who still might find the science opaque or unconvincing, it doesn't take a science degree to see that the Arctic ice is melting rapidly or that the sea level is rising.

As Assistant Secretary of the Navy, I oversaw all Navy and Marine Corps installations, and I can tell you that our base commanders know that we don't have the luxury of waiting to be inundated before shoring up our facilities. Our commanders are working to reduce the risk of current investments by incorporating resilience and placing new facilities away from risk. They know that what used to be considered once in a lifetime storms are now happening annually. Our planning is changing, and it makes more sense to invest in risk reduction and mitigation factors now than to wait for adverse mission impacts and to pay for enormously expensive repairs after the fact.

The Department of Defense, across both Democratic and Republican Administrations, has made efforts to prepare for this risk as has Congress. In the last two years, the previous Congress passed a large number of measures in the National Defense Authorization Act focused on improving resilience to climate change and on planning for future challenges – particularly in the Arctic.[5] In the military security space, Congress has, on a bipartisan basis, moved past old debates on whether there is a problem and has begun planning to ensure we are ready to meet the significant climate change challenge that is before us now and that we will continue to confront for the foreseeable future.

While climate's role in conflict is complex and intertwined with the broader geopolitical considerations, it is nonetheless clear. I have studied this issue for years, both as a member of the Advisory Board of the Center for Climate and Security and previously as a member of the CNA Military Advisory Board.

While serving as a member of the Military Advisory Board back in 2007, we concluded that climate change poses a "serious threat to America's national security", acting as a "threat multiplier for instability" in some of the world's most volatile regions, adding

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[4] Werrell and Femia. "UPDATE: Chronology of U.S. Military Statements and Actions on Climate Change and Security: 2017-2019." The Center for Climate and Security. February 16, 2019. Accessed at: www.climateandsecurity.org/2019/02/16/update-chronology-of-u-s-military-statements-and-actions-on-climate-change-and-security-2017-2019/

[5] Conger, John. "U.S. Congress Addresses Climate Change and Security in the Latest Defense Bill." The Center for Climate and Security. August 13, 2018.

tension to stable regions, worsening terrorism and likely dragging the United States into conflicts over water and other critical resource shortages.[6] This echoes the same conclusions that have been consistently drawn by the US Defense and Intelligence Communities. On the most basic level, climate change has the potential to create and amplify sustained natural and humanitarian disasters on a scale and at a frequency far beyond those we see today. The consequences of these disasters will add additional stress to political stability where societal demands for the essentials of life exceed the capacity of governments to absorb these stresses. In too many cases and for the reasons noted below, fragile societies and governments will fail, creating chaotic security environments across the spectrum of conflict.

Climate change is different from traditional military threats; it is not like having a specific enemy, a rapid and well-defined response timeline, or a clearly located crisis region to which we must take action. Rather, climate change has the potential to create more frequent, intense and widespread natural and humanitarian disasters due to extreme weather events like flooding, drought, sea level rise that can lead to the spread of diseases, crop failure and the consequent migration of large populations. These climate-driven severe weather events will magnify existing tensions in critical regions, overwhelm fragile political, economic and social structures, causing them to fracture and potentially fail. The predictable result: much greater frequency and intensity of regional conflict and direct threats to U.S. interests and national security. That's why in 2016, a number of senior military and national security leaders concluded that the effects of climate change presented a "strategically-significant risk to U.S. national security and international security."

As one example, climate change didn't directly cause the Syrian civil war. But by causing prolonged and extreme drought conditions in a land whose reliance on rain-fed agriculture made it vulnerable, significant internal displacement ensued. Added to existing economic, religious and ethnic tensions, this drought-caused population displacement ultimately contributed to a violent and prolonged civil war that rapidly expanded to envelop the entire region.[7]

In the Lake Chad region of Africa, we see American troops deployed to counter the influence of Boko Haram. At the same time, however, the economic displacement that has resulted from the receding of Lake Chad and loss of surrounding vegetation, driven in large part by a changing climate, is creating a stressed population that is highly vulnerable to terrorist recruitment. This contributed to the inclusion of a climate and security provision in a UN Security Council resolution on Lake Chad in 2017.[8]

In Venezuela, where glaciers are receding at an alarming rate, one of the many causes of protest of the current Maduro government is the failure to manage water shortages

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[6] National Security and the Threat of Climate Change. CNA. Report. 2007.

[7] Femia, Francesco and Caitlin Werrell. "Syria: Climate Change, Drought and Social Unrest." The Center for Climate and Security." February 2012; and Kelley, Colin P et al. "Climate Change in the Fertile Crescent and implications of the recent Syrian drought." Proceedings of the National Academy of Sciences of the United States of America.

[8] Un Security Council. Resolution 2349 (2017). March 31, 2017

with a resulting loss of hydro energy resources in the face of the worst drought in 40 years.[9]

In Pakistan, internal tensions over the allocation of water resources already exist. How are these going to be exacerbated if India, which already uses threats to block the flow of water, makes cross border incursions to secure water resources, and more conflict arises? What impact will loss of Himalayan glaciers and annual increases in drought have across the entire South Asian population of billions? Just as we have been concerned about the fate of chemical weapons in Syria when it devolved into chaos, what can be done to ensure Pakistan and its nuclear weapons don't follow a similar path if climate-exacerbated stresses make the country even more fragile? Instability in nuclear-armed nations and the potential for regional war is one of most serious climate-related challenges facing the global community.

More broadly and happening across the globe, consider the challenge of international migration -- already a daunting and complex issue in the Americas and in Europe. With the stressors of climate change things are not going to get better. The British government's Foresight report on environmental threats makes plain what a warming world will deliver. "There will be different migration patterns in the future because of environmental change," it reads. And why should that surprise us? In the wake of Hurricane Katrina, 250,000 people shifted from New Orleans to Texas as a result of the floods.

My intent today is not to tell you that we can stop climate stresses from impacting global events or stoking instability. That instability is already happening. However, if we're aware of these serious climate change factors, we can take prudent steps that reduce risk and put us in a much better position to protect American and allied interests.

In the whole of government approach to address the problem that former Secretary Mattis described, scientists are studying climate models and working to more accurately project the future environment; the intelligence community is assessing the risks and implications of those changes; and the military is adapting to this new world and considering how to adjust our Services' defense capabilities and capacities to operate in the new environment. The State Department must increase U.S. leadership and undertake efforts to engage the international community to support frameworks that decrease tensions and promote stability, to build capacity and resilience, to address food and water insecurity through targeted assistance, to respond to international humanitarian disasters, to work closely with our partners to address this challenge.

However, our future is yet to be written. The choices we make today will decide the security environment that comes decades hence, and that is why it is so important to embrace the challenge to reduce the intensity of climate risks by bringing down carbon emissions. The announcement that the United States will withdraw from the Paris Agreement is not only contrary to our historic ability to rise to meet any challenge, but it

[9] Chemnick, Jean. "Where Climate Change Fits into Venezuela's Ongoing Crisis." February 18, 2019.

also represents an abdication of American leadership on the world stage. Allies and alliances matter, and the withdrawal from this accord – one which carries paramount importance to us and to our partners – serves to greatly erode American credibility and to create distance between us.

Moreover, our withdrawal creates an opening for other nations to marginalize the United States. China, in particular, is engaging fragile nations by validating their concerns and providing assistance. It is expanding its influence by promoting the Paris Agreement.

For too long as a nation, we've ignored global climate change, a threat that is already happening -- one that is statistically more likely to happen and with more dire consequences-- than war with North Korea. For this and for the many other compelling reasons I have outlined, the importance of this Committee and the Congress opening a serious discussion on climate and national security and climate change cannot be overstated. These discussions must lead to effective and timely action. If we're serious about dealing with migration, containing instability and preventing conflict and humanitarian crises, responding to adverse Russian and Chinese influence, and maintaining healthy economic growth and trade, then we must lead and meet the challenge of global climate change.

As in the many past serious challenges that the United States has successfully faced, the future is ours to make. We have the knowledge; we now need the will to act on it. Our future economy, national security and very quality of life as Americans await our decisions.

Mr. KEATING. Any objection?
Thank you, you may submit that.
Thank you for your testimony.
Ms. Goodman.

STATEMENT OF SHERRI GOODMAN, FORMER DEPUTY UNDER-SECRETARY OF DEFENSE FOR ENVIRONMENTAL SECURITY

Ms. GOODMAN. Thank you, Mr. Keating, Ranking Member McCaul——

Mr. KEATING. Your microphone.

Ms. GOODMAN. Thank you, Mr. Keating, Mr. McCaul, distinguished members of the committee, it is a pleasure to be with you today. Thank you for holding this important hearing. My views are shaped by my 30 years of experience as a national security professional.

At the outset, I would like to acknowledge that while climate change discussions have been polarized, there has been one major exception, and that is security. The Chairman of the Joint Chiefs of Staff, General Dunford, Supreme Allied Commander of Europe, General Scaparotti, former Secretary of Defense, Jim Mattis, and many other senior leaders of the Department of Defense have been clear-eyed about this issue and the threat multiplier effect on our national security.

The intelligence community has identified climate change as a security risk in every worldwide threat assessment for more than a decade, including the 3-years of this administration. Congress has passed multiple important provisions in the last two defense authorization bills, including a declaration that climate change poses a direct threat to the national security of the United States. Both were signed into law.

I want to thank the members of this committee for their bipartisan support for these measures.

Recently, I, Admiral McGinn, and 56 other senior military, national security, and intelligence leaders, who served across Republican and Democratic administrations, sent a letter to the President affirming the consensus view in the national security community that climate change is a threat to U.S. national security. Building on this consensus, I would recommend the Committee adopt a pragmatic view of the security threat that climate change poses and respond in a way commensurate to that threat.

We need to acknowledge that the newly navigable Arctic Ocean is emboldening our adversaries. As the ice melts, Russia and China are increasingly moving to exert control and influence over the region. For example, Russia is building up its military presence in the north, and is seeking to monetize the Northern Sea route by proposing a toll road for military escort through shallow waters close to the Russian coastline.

We should incorporate the impacts of increasing water scarcity as a result of climate change and other factors into our risk calculations for international conflict, especially as nations may increasingly be compelled to use water resources as leverage. For example, in the most recent escalation of tensions between India and Pakistan, India used the diversion of rivers as a threat. China

holds similar leverage over India with the Indus River's origin in China.

China may also respond to climate stresses by asserting itself more aggressively over shared resources in its region, such as fish stocks in the South China Sea that are moving northward as the sea warms.

Further, China sees an opportunity for strategic benefit vis-a-vis the United States by investing in the climate resilience of countries in the Asia Pacific region and beyond. We should take note and not let China out-maneuver us.

Climate stresses across Africa and the Middle East are also increasing economic and food insecurity, driving migration and forced displacement, making it easier for violent extremist organizations to recruit members and increase the likelihood of conflict.

The good news, however, is that despite these unprecedented threats, we have unprecedented foresight capability. Technological advancements and more sophisticated predictive tools in both the physical and social sciences, and in the research and development capacities inherent in our many national security and civilian agencies, mean we can see more of these threats coming with a greater degree of reliability than ever before.

The bottom line is that we have a responsibility to look at climate change and its impacts pragmatically in terms of America's national interests. We have a responsibility to account for the current and future climate change stresses in our security calculations, our planning, our foreign policy, and our investments overseas. And, we have a responsibility to prepare for the changes that we can see coming.

That responsibility includes advancing a robust agenda for addressing security implications of climate change by reducing the scale and scope, investing in resilience of both energy and infrastructure, adapting to those effects that are already locked in, and supporting our partners and allies through American leadership in climate security.

Thank you, Mr. Chairman. I ask that my written statement be submitted for the record.

[The prepared statement of Ms. Goodman follows:]

Testimony of Sherri Goodman
Former Deputy Undersecretary of Defense for Environmental Security
Board Chair, The Council on Strategic Risks
Senior Strategist, The Center for Climate & Security
Senior Fellow, Woodrow Wilson Center
Founder, CNA Military Advisory Board

Before the United States House of Representative
Committee on Foreign Affairs
Hearing: "How Climate Change Threatens U.S. National Security"
April 2, 2019

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

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[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

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[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

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[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

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[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

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[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.

Mr. KEATING. Thank you, Ms. Goodman. You were there right to the second. Unbelievable.

Mr. Weisenfeld.

STATEMENT OF PAUL WEISENFELD, EXECUTIVE VICE PRESIDENT, INTERNATIONAL DEVELOPMENT, RTI INTERNATIONAL

Mr. WEISENFELD. Mr. Keating, Ranking Member McCaul, distinguished members of the committee, thank you for the opportunity to testify today and for calling this hearing on such an important and timely topic. I have submitted my full written testimony for the record and will summarize it in my remarks this morning.

Throughout my career in development at USAID and at RTI, International I have been honored to work on U.S.-supported programs related to agriculture, the environment, global health, democracy and governance, and more. The topic of today's hearing brings to mind two important truths that I have learned during my career. First, development affects U.S. national security and, second, climate change affects development.

Put simply, American national security interests benefit when countries are stable, secure, and able to meet the basic needs of their citizens. This is why development, along with defense and diplomacy, is one of the three D's of U.S. national security.

The best chance we have to promote resilience is to support development geared toward strengthening systems to withstand climate-related pressures. As USAID Administrator Green has said, the ultimate purpose of foreign assistance is to end its need to exist.

Climate variability exacerbates the challenges facing developing countries and complicates local government's capacity to enable food and water security. Rising temperatures not only threaten crops, livestock, and water supplies, but also allow for the spread of diseases by expanding the habitable range of mosquitoes and parasites.

The United States has been a leader in responding to these trends and promoting resilience in developing countries. For example, the U.S. Government's Feed the Future initiative—on which I had the privilege to work—has seen incredible success. This effort has helped more than 5 million families avoid hunger, and helped farmers generate $10 billion in new agricultural sales. I want to thank this committee for its steadfast support for this initiative.

I have had the opportunity to speak with smallholder farmers and their families in Africa, Asia, and Latin America. When they talk about what most worries them, many say climate change. For these farmers and their families—and by extension their communities and countries—these changes can mean the difference between a life of dignity or one of desperation.

Many organizations funded by the U.S. Government are working across the globe employing innovative and successful practices and technologies to promote resilience in the face of climate-related pressures. Introducing these innovations in impoverished areas helps farmers and herders adapt, and it can prevent communities from backsliding into hunger and conflict. Let me give a few examples.

As part of a USAID-funded program in the Philippines, our team developed water resource maps for the conflict-prone island of Mindanao. The program revealed that the region's top agricultural exports—all of which are water intensive—were being planted in water-stressed areas. We provided suggestions for improving water management, thus protecting livelihoods in the face of climate-related risks.

In Somalia, RTI, funded by USAID, implemented an innovative camel leasing model in response to recent droughts, helping herders protect their livestock and their incomes from climate-related threats.

In Souther Senegal, a Feed the Future project implemented by RTI is working to strengthen food systems for staple crops. This project installs solar-powered rain gauges, allowing insurers to accurately determine when farmers may be at risk of failed production. Equipped with this tool, smallholder farmers are more likely to invest in quality inputs that yield more and product better-quality products demanded by buyers.

Organizations like mine are also stepping up. Through an internal investment, RTI is working in Rwanda to develop a model using drones and artificial intelligence to identify with greater precision which crops will grow and when, such as whether maize will grow in a certain region by 2030.

When the United States invests in development, we are investing in security. When we partner with countries to strengthen food security, better manage natural resources, eliminate diseases, or strengthen democratic practices, we are helping them take ownership of building a stable and more secure future.

To conclude, there is no doubt that drought, famine, or a disease outbreak will again threaten vulnerable populations in fragile countries. But this is not a losing battle. The United States has a record to be proud of. We have effective approaches that promote stability in developing countries in the face of climate change and other threats.

This cannot be done without the United States Congress' continued support. I want to thank you again for your leadership and commitment on this issue.

[The prepared statement of Mr. Weisenfeld follows:]

Submitted Testimony by Paul Weisenfeld
Executive Vice President, International Development
RTI International

House Committee on Foreign Affairs Hearing: "How Climate Change Threatens U.S. National Security"

April 2, 2019

Chairman Engel, Ranking Member McCaul, and Members of the Committee, thank you for the opportunity to testify today and for calling this hearing on such an important and timely topic.

Throughout my career in development, first at the U.S. Agency for International Development (USAID) and now at RTI International, I have been honored to work in several countries and regions, overseeing U.S.-supported programs related to agriculture, the environment, global health, and more. Some of the countries in which I have worked, such as Zimbabwe, experienced significant instability and conflict while I was there. The topic of today's hearing brings to mind two important truths that I have observed throughout my career: first, other countries' development affects U.S. national security; second, climate affects development.

Put simply, American national security interests benefit when countries are stable and secure, and are able to meet the basic needs of their citizens. This is why development is rightly considered, along with defense and diplomacy, one of the "three Ds" of U.S. national security.

Developing countries are particularly vulnerable to climate-related events and trends, including extreme weather and erratic weather patterns, because they can threaten basic needs for survival, such as food security and water security. This vulnerability has consequences for U.S. national security. When a country is unable to meet the basic needs of its citizens, including enabling reliable access to food, water, and economic opportunity, instability is very often not far behind. This is even more true for countries where governments have weak capacity to respond to shocks and local institutions are fragile.

USAID Administrator Mark Green has rightly raised the question of how U.S. foreign assistance can "foster resilience in people and communities so they can withstand future crisis, or better yet, lead normal lives."[1] As climate change contributes to crises and instability in the developing world, holistically supporting the development of vulnerable countries and communities is the best way to strengthen their resilience, bolster self-reliance, and foster stability and security.

[1] USAID, "USAID Administrator Mark Green Delivers Remarks at the Opening Session of Global Innovation Week," September 28, 2017. https://www.usaid.gov/news-information/press-releases/sep-28-2017-usaid-administrator-mark-green-delivers-remarks-opening-session

An increasingly vulnerable world

Recent progress in strengthening global food security is now at risk. Global food prices spiked in 2007–2008, then declined for nearly a decade. Since 2014, however, the prevalence of food insecurity and undernutrition[2] has increased. The amount of undernourished people globally grew from around 804 million in 2016 to 821 million the following year. That is an increase of 17 million people in just one year suffering real consequences from not having enough, and the right kinds, of food.

Driven primarily by climate variability and conflict, famine threatened the lives of an estimated 20 million people in Nigeria, Somalia, South Sudan, and Yemen in 2017.[3] More broadly that year, nearly 124 million people in 51 countries and territories faced food crises, an increase from 80 million people in 2015 and 108 million people in 2016.[4]

Looking ahead, the global population is expected to reach 9.8 billion in 2050,[5] increasing pressure on an already resource-scarce planet. Globally, we will need to produce 60 percent more food than we do now in order to feed this larger population.[6] At the same time, crop yields are expected to decrease for maize, rice, and wheat, three of the world's most important food crops.[7]

Demand for water is projected to increase between 30 and 50 percent by 2050.[8] Approximately 2.4 billion people live in water-scarce regions, and more than one-half of the global population could be at risk of water stress by 2050.[9] Water scarcity and insecurity are making it more difficult to meet the demand for water for agriculture, energy generation, and other needs. The 2017 *U.S. Government Global Water Strategy* states that some regions could see a decline in economic growth due to decreasing water supplies and increasing demand, with major

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[2] Food and Agriculture Organization of the United Nations (FAO), "2018: The State of Food Security and Nutrition in the World." http://www.fao.org/state-of-food-security-nutrition/en/

[3] Jane Ferguson, "20 Million Starving to Death: Inside the Worst Famine Since World War II—A Report from South Sudan," Vox, June 1, 2017. https://www.vox.com/world/2017/6/1/15653970/south-sudan-hunger-crisis-famine

[4] FAO, "2018: The State of Food Security and Nutrition in the World." http://www.fao.org/state-of-food-security-nutrition/en/

[5] United Nations Department of Economic and Social Affairs, "World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100," June 21, 2017. https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html

[6] Nikos Alexandratos and Jelle Bruinsma, *World Agriculture Towards 2030/2050: The 2012 Revision,* Agricultural Development Economics Division, FAO. http://www.fao.org/3/ap106e/ap106e.pdf, p. 7.

[7] Rosegrant et al. https://www4.unfccc.int/sites/SubmissionsStaging/Documents/201811071654---CLI%20Submission%20IFPRI%20report%20full%20size.pdf, p. 57.

[8] Chicago Council on Global Affairs, *From Scarcity to Security: Managing Water for a Nutritious Food Future,* March 2019. https://www.thechicagocouncil.org/sites/default/files/report_from-scarcity-to-security_20190321.pdf, p. 14.

[9] Claudia Ringler et al., "Role of Water Security for Agricultural and Economic Development – Concepts and Global Scenarios," in *Handbook on Water Security,* ed. Claudia Pahl-Wostl, Anik Bhaduri, and Joyeeta Gupta (Cheltenham, UK: Edward Elgar Publishing Limited, 2016), pp. 183–200.

implications for global food security and regional stability.[10] In the same report, the State Department noted that "[t]he Department views water security as an issue of national security."[11]

Agriculture is the backbone of the economy in many developing countries and is highly susceptible to water shortages, among other climate-related factors such as temperature, erratic rainfall patterns, and pests. The poorest, most vulnerable farmers typically depend on the rain not just for their livelihoods, but also to provide daily food for their families. Diminished opportunities in agriculture harm economic growth, health, and employment, and drive migration both internally and externally in many developing countries.

On the health front, rising temperatures are affecting the transmission of diseases, particularly those that are transferred through water and insects. As average temperatures around the world rise, mosquitoes that transmit malaria, dengue, chikungunya, yellow fever, and Zika have become more widely distributed and more abundant. We have seen such phenomena even in the United States in the past decade with West Nile virus and Lyme disease, as the mosquitoes and ticks transmitting them have expanded their range. Increased burdens from these diseases place further stress on health systems that already struggle to respond to acute crises and outbreaks. As we witnessed during recent epidemics of Ebola and Zika, diseases respect no borders. Stronger health systems abroad make us safer at home.

Developing countries are especially vulnerable to these and other threats because they may already be struggling to meet the basic needs of their citizens related to food, nutrition, education, health, economic opportunity, good governance, and more.

Among the most vulnerable are the approximately 500 million smallholder farmers[12] around the globe, many of whom are on the cusp of hunger and food insecurity. I have spoken with smallholder farmers in many geographically disparate countries, such as Kenya, Senegal, Uganda, Cambodia, and Peru. I've asked them about the biggest challenges they face. Many say climate change. They talk about changing weather patterns and how they no longer know when rain is coming. They say that pests that they never had to deal with before are damaging crops. They also talk about more droughts, floods, and other weather-related challenges. For these individual farmers and their families—and by extension their communities and countries—their ability to respond to these climate-related perils can mean the difference between a life of dignity and one of desperation. In countries where the government has limited capacity or sometimes unwillingness to support poor households in responding to these issues, the consequences are often more dire.

Another particularly vulnerable group is youth. Young people from rural communities throughout the developing world are increasingly migrating to urban areas in search of better opportunities, placing them at risk of social marginalization, a loss of community and family

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[10] *U.S. Government Global Water Strategy 2017.* https://www.usaid.gov/sites/default/files/documents/1865/Global_Water_Strategy_2017_final_508v2.pdf, p. 7.
[11] *U.S. Government Global Water Strategy 2017.* https://www.usaid.gov/sites/default/files/documents/1865/Global_Water_Strategy_2017_final_508v2.pdf, p. 13.
[12] Sarah K. Lowder, Jakob Skoet, and Terri Raney, "The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide," *World Development,* Volume 87, November 2016, pp. 16–29. https://www.sciencedirect.com/science/article/pii/S0305750X15002703

structure, and recruitment by gangs and extremist organizations. We can expect this trend to grow as rural areas struggle with the impacts of climate variability.

A threat to security and stability

These trends are deeply concerning for global security. Whatever the drivers of a particular food, water, economic, or health crisis, one thing they all have in common is the potential to undermine and inflame fragile social, economic, and security situations. Water and food are the most basic of human needs. They are affected by many complex factors, including climate, demographics, global economic pressures, government policies, and private investment. It is clear, however, that when they are not available in sufficient supply, families and communities react, taking the actions they deem necessary to survive.

The 2019 *Worldwide Threat Assessment of the U.S. Intelligence Community* by the Director of National Intelligence addresses why these developments concern the U.S. national security community. According to the Assessment, "Global 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." The Assessment further notes that "[c]hanges in the frequency and variability of heat waves, droughts, and floods—combined with poor governance practices—are increasing water and food insecurity around the world, increasing the risk of social unrest, migration, and interstate tension in countries such as Egypt, Ethiopia, Iraq, and Jordan." [13]

Droughts that occurred in Syria between 2006 and 2011 caused 75 percent of crops to fail and an 85 percent loss of livestock. This crisis fueled the migration of more than one million Syrians from rural to urban areas. Observers believe this displacement added to the domestic instability surrounding the country's civil war,[14] creating fertile ground for ISIS and forcing more than 5.6 million Syrians to leave the country as refugees.[15] Globally, the International Organization for Migration found that between 2008 and 2017, an average of 25.3 million people had been displaced annually, the vast majority due to disasters rather than violence. The organization further found that in 2016, 97 percent of people who fled their homes did so due to "disasters triggered by climate and weather-related hazards."[16] The World Bank has estimated that by 2050, more than 140 million people in sub-Saharan Africa, South Asia, and Latin America could be driven from their homes as "climate migrants."[17]

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[13] Daniel R. Coats, *Worldwide Threat Assessment of the US Intelligence Community,* delivered to the Senate Select Committee on Intelligence, January 29, 2019. https://www.dni.gov/files/ODNI/documents/2019-ATA-SFR---SSCI.pdf, p. 23.

[14] Chicago Council on Global Affairs. https://www.thechicagocouncil.org/sites/default/files/report_from-scarcity-to-security_20190321.pdf, p. 22.

[15] World Vision, "Syrian Refugee Crisis: Facts, FAQs, and How to Help." https://www.worldvision.org/refugees-news-stories/syrian-refugee-crisis-facts

[16] International Organization for Migration, *World Migration Report 2018.* https://publications.iom.int/system/files/pdf/wmr_2018_en.pdf, p. 38.

[17] The World Bank, "Climate Change Could Force Over 140 Million to Migrate Within Countries by 2050: World Bank Report," March 19, 2018. https://www.worldbank.org/en/news/press-release/2018/03/19/climate-change-could-force-over-140-million-to-migrate-within-countries-by-2050-world-bank-report

In Nigeria, as noted by Ambassador John Campbell before the House Committee on Science, Space, and Technology in 2017, agricultural and grazing land is claimed each year by the Sahara desert, leading to higher levels of impoverished herders and farmers. At the same time, Lake Chad is shrinking. As the Ambassador testified, "Less arable land, less water, and more people are a recipe for a cycle of violence." This truth applies to any country. As Campbell notes, in Nigeria it has encouraged the rise of Boko Haram.[18]

Maintaining the momentum: Continuing America's smart investment in development

Poverty is a driver of vulnerability, but it's clear that other factors, including climate, exacerbate poverty and compromise the progress we're making. The best chance we have to promote resilience to crises is to address the underlying causes of poverty and insecurity, and to strengthen systems to withstand climate-related pressures. Tackling these causes requires strong, consistent U.S. leadership to support multisectoral, integrated approaches—for instance, those looking holistically at the complex interplay of food security, nutrition, water, energy, and governance. Equally important, it requires development programs that promote local ownership, sustainability, and self-reliance.

As Administrator Green has said, the ultimate purpose of foreign assistance is to end its need to exist.[19] Development is hard work and not every program is successful. But resounding success stories are all around us and illustrate the strong economic return on a relatively small investment in foreign assistance. Let me start with an example from the health sector that shows how we can achieve lasting solutions to very difficult problems. USAID's neglected tropical diseases (NTD) program[20] has supported the elimination of certain insect-borne NTDs in Ghana, Togo, Laos, Cambodia, Vietnam, and Nepal. The program proves that fundamentally solving—not just reducing—complex development challenges is possible. Congress's investment in USAID NTD programs has resulted in more than 100 million people no longer at risk for trachoma, and more than 250 million no longer at risk for lymphatic filariasis. In other words, we are winning the global fight against NTDs and moving ever closer to the day when the interventions that USAID supports to combat them will no longer be needed. Also in health, tremendous results have been achieved through the U.S. President's Emergency Plan for AIDS Relief and the U.S. President's Malaria Initiative.

Over the course of my career, I've seen significant changes in the way international development programs are carried out. Across all sectors in development, programs have embraced the best lessons of modern management. They are harnessing new technologies to reach scale, and utilizing scientific techniques to improve program monitoring and evaluation. Just as important,

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[18] John Campbell, "National Security Implications of Climate Change," delivered before the U.S. House Committee on Science, Space, and Technology, July 12, 2017. https://www.cfr.org/blog/national-security-implications-climate-change

[19] Michael Igoe, "USAID Chief Mark Green's First Day at the Office," Devex, August 8, 2017. https://www.devex.com/news/usaid-chief-mark-green-s-first-day-at-the-office-90835

[20] RTI implements ENVISION, USAID's flagship NTD program: "ENVISION: A World Free of Neglected Tropical Diseases—Controlling and Eliminating Seven Neglected Tropical Diseases in Low-Income Countries Around the World," n.d. https://www.rti.org/impact/envision-world-free-neglected-tropical-diseases

they are using that information to course-correct and achieve better results. Many programs are working across multiple sectors to promote more holistic solutions and better outcomes, such as food security programs that are also improving child health and nutrition. Whatever their focus, programs are most effective when they are designed to strengthen local government systems in order to build countries' capacity to take ownership of their own development journey, to engender trust from their citizens by providing better public services, and ultimately to move from dependence on aid to self-reliance.

Other specific opportunities exist to improve global food and water security.

I appreciate how USAID is revamping its structure to better draw together its efforts in food, water, nutrition, and resilience, among other sectors. The challenges of climate-driven food and water insecurity are complex and interrelated. They must be tackled together, and this reorganization promises to strengthen the Agency's ability to develop and implement effective, integrated solutions to global food and water security challenges.

Advances in technology and improved farming practices promise to help farmers increase production in an environmentally sustainable manner. Drought-resistant seeds, drip irrigation, precision application of fertilizers and agrochemicals, better pest management, improved livestock breeding, conservation farming, and improved watershed and soil management can all help increase production and enhance climate resilience.[21] Introducing these technologies in impoverished areas and getting farmers and herders to adopt them requires a sustained commitment, but it is money well spent to prevent a backslide into insecurity and conflict.

Technology is also producing better awareness and foresight. Using internal funding, RTI is developing a model to help agricultural stakeholders in Rwanda more readily identify what crops will grow and when, such as whether maize will grow in a certain region by 2030.[22] Helping farmers, the private sector, and governments identify areas more likely to experience changing agro-ecological conditions—and significant corresponding changes in the production process—will also help identify emerging threats to food security and ways to mitigate them.

Similarly, as part of a USAID-funded program in the Philippines,[23] RTI developed water resource maps for the conflict-prone island of Mindanao, which produces about 40 percent of the country's agricultural output. The study projects the water resource status of water-rich and water-stressed areas a decade into the future, based on assumptions on climate change and land use. This information revealed that the region's top four agricultural exports, which are all water

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[21] Paul Weisenfeld and Anna Wetterberg, "Technological Advances to Improve Food Security: Addressing Challenges to Adoption," Research Brief, RTI Press, October 2015. https://www.rti.org/sites/default/files/resources/rti-publication-file-7e1980eb-b8d1-42f0-8db4-d58bb8bfa58c.pdf, p. 2.

[22] RTI Grand Challenge project: "Using Satellite Images and Artificial Intelligence to Improve Agricultural Resilience: An RTI Grand Challenge," n.d. https://www.rti.org/impact/using-satellite-images-and-artificial-intelligence-improve-agricultural-resilience

[23] "B-LEADERS (Building Low Emission Alternatives to Develop Economic Resilience and Sustainability): Developing Renewable Energy Resources and Increasing the Resiliency of the Electrical Grid in the Philippines," n.d. https://www.rti.org/impact/b-leaders-building-low-emission-alternatives-develop-economic-resilience-and-sustainability

intensive, are being planted in water-stressed areas. The study offered suggestions for mitigating the risk and improving water management.

Helping food producers adapt to climate variability can protect food security while saving their livelihoods. For instance, in Somalia, where the livestock sector is critically important to the economy, the RTI team implementing a USAID-funded program[24] noticed that as the dry season began in 2016 and drought was imminent, the lucrative livestock milk supply was at risk. Herds were producing little or no milk due to limited access to water, reduced availability of affordable feed, and higher disease prevalence. The program introduced an innovative camel-leasing model through which privately owned dairy companies lease animals from pastoralists during a drought to ensure sufficient commercial milk supply, with profits shared between the pastoralists and dairy companies. In return, the companies provide the animals with veterinary services, water, and feed. This arrangement helps maintain the nutrition and health of the camels, provides predictable household income, and serves as a model that may be a win–win for the private sector and households. This program reminds us that innovative practices can improve resilience and stability in the face of drought in Somalia.

In Senegal, a Feed the Future-funded project implemented by RTI[25] is working to strengthen the entire food system for staple crops—from farms, to markets, to tables. This includes working with farmers, private sector processors and traders, the government, and the local financial sector to create a stronger system that is more resilient to shocks and stresses and helps vulnerable communities bounce back quicker and more easily when such events do occur. As one example, the project has worked with local insurers and others to help reduce the risk that farmers face if rainfall is insufficient, erratic, or excessive. This has led to the installation of 88 solar-powered, automated rain gauges throughout Senegal's southern zone, which allows insurers to quickly access rainfall data and accurately determine when farmers may be at risk of failed production, and to then compute rain-indexed insurance payouts. Through this risk-mitigation tool, smallholder farmers are more likely to invest in quality inputs that yield more and generate better-quality products demanded by buyers.

Many other things can be done, and are already being done, to strengthen food security, water security, and broader development around the world. The United States has a long and distinguished record as a global leader of which it should be proud. The Food for Peace program, founded by President Eisenhower in 1954, is one of our most enduring success stories. The program has provided food to more than four billion people in need for more than six decades.[26]

More recently, the Initiative to End Hunger in Africa, started during the George W. Bush administration, evolved into the global Feed the Future initiative in the wake of the 2007–2008 global food-price crisis. I want to thank this Committee for your role in strengthening and institutionalizing this effort with the bipartisan Global Food Security Act in 2016 and its reauthorization last Congress. Feed the Future helps lower-income countries to boost their food

[24] The USAID Somalia Growth, Enterprise, Employment, and Livelihoods (GEEL) program.
[25] "Feed the Future Senegal Naatal Mbay: Facilitating Market Opportunities for Grain Producers in a Country Striving for Self-Sufficiency," n.d. https://www.rti.org/impact/feed-future-senegal-naatal-mbay
[26] USAID Office of Food for Peace web pages. https://www.usaid.gov/who-we-are/organization/bureaus/bureau-democracy-conflict-and-humanitarian-assistance/office-food

security by reducing poverty and hunger and strengthening their resilience to shocks and stresses. I've already mentioned one example of a highly successful Feed the Future program. Overall, the initiative has helped an estimated 5.2 million families who are no longer suffering from hunger, and helped farmers generate $10.5 billion in new agricultural sales.[27] During my time at Feed the Future, I met women in countries such as Cambodia, Ethiopia, Ghana, Kenya, and Tanzania who tripled their harvests—and, therefore, their incomes—with the help of the initiative.

Many other U.S. development programs, past and present, have achieved tremendous success in saving and improving the lives of the world's poor and vulnerable.

Development strengthens U.S. national security

President Reagan once said, "Our national interests are inextricably tied to the security and development of our friends and allies."[28]

It's clear why this is true. When development fails, states fail. When development is threatened—by climate change or anything else—U.S. national security is threatened.

When the United States invests in development, we're investing in security. Whether we are helping countries strengthen food security, better manage their scarce natural resources such as water, improve health, eliminate diseases, improve early grade education, bolster economic opportunity, or strengthen democracy, we are helping them take ownership of building a stable future.

The impacts of climate change are intensifying the development challenges that vulnerable people, countries, and regions are already struggling with. They are another reason why U.S. foreign assistance, which promotes stability in some of the world's most fragile areas, is a vital tool for strengthening U.S. national security.

Thank you again for the opportunity to testify. I look forward to answering questions from the Committee.

Paul Weisenfeld is executive vice president for international development at RTI International, an independent nonprofit research institute. In this position, he leads RTI's international development practice, which designs and implements programs across a wide range of sectors to help lower- and middle-income countries and communities address complex problems and improve the lives of their citizens.

Before joining RTI, Mr. Weisenfeld served as a foreign service officer for the United States Agency for International Development (USAID), achieving the highest rank of career minister in

[27] Feed the Future web pages. https://www.feedthefuture.gov/
[28] U.S. Global Leadership Coalition, "President Reagan on Foreign Assistance." http://www.usglc.org/downloads/2015/09/Reagan-on-Foreign-Assistance.pdf

the Senior Foreign Service, and led high-profile initiatives across various international development sectors. During this time, Mr. Weisenfeld directed the Bureau for Food Security at USAID, which leads Feed the Future, the U.S. Government's global hunger and food security initiative. He also led the Haiti Task Team, charged with coordinating relief and reconstruction planning following the devastating earthquake in 2010, and served as USAID Mission Director in Peru and Zimbabwe. Mr. Weisenfeld received the USAID Administrator's Distinguished Career Service Award, the agency's highest award. He served in Africa, the Middle East, and Latin America.

Mr. Weisenfeld holds an honorary Doctorate in Public Administration from Monmouth College, Illinois. He also holds a J.D. from Harvard Law School and a B.A. from Queens College of the City University of New York. He serves on the boards of the U.S. Global Leadership Coalition and the Society for International Development – Washington Chapter.

Mr. KEATING. Thank you, Mr. Weisenfeld.
Mr. Worthington.

STATEMENT OF BARRY K. WORTHINGTON, EXECUTIVE DIRECTOR, UNITED STATES ENERGY ASSOCIATION

Mr. WORTHINGTON. Thank you, Mr. Keating. Good morning, Ranking Member McCaul, and other members of the Committee on Foreign Affairs.

The U.S. Energy Association helps expand energy infrastructure in developing countries with the U.S. Agency for International Development, and we also contribute to policy and technical discussions with the U.S. Department of Energy to expand the use of clean energy technology around the world.

Through our membership we represent over 100 companies and associations across the U.S. energy sector, from the largest Fortune 500 companies to single-person consulting companies, and everything in between. Our membership is both energy production and energy efficiency companies, but also engineering, finance, legal, research, and consulting organizations.

Our objective is to convey information about the realities of global energy issues in the 21st Century. We are an educational organization both by function and by tax status.

And, again, thank you for inviting me to appear before you today.

The risk of climate change is real, and industrial activity all around the world is impacting climate. Addressing climate change is a challenge for our country. It affects every citizen in the world.

While our industry addresses the changing climate, it continues to ensure that American citizens have access to increasingly safe, affordable, reliable, and clean energy.

We have more than a billion global citizens, a billion global citizens with no access to energy, and another billion-plus with inadequate access. Women in developing countries spend all day foraging for sticks and animal dung to generate energy for cooking, lighting, and heating. This is very dangerous. Burning firewood and animal dung indoors kills children, it causes asthma, and all kinds of other health problems. Access to energy provides improved health, education, and economic development. Considering a global population growth of another 2 billion people by mid-century, it leaves our energy industry globally to provide for 4 billion more energy consumers by 2050.

Our industry's challenge is to double the provision of energy services globally, while reducing greenhouse gas emissions.

Many of these new energy consumers all around the world will utilize fossil fuels because they are domestically available, they are abundant, and they are affordable. We should all work harder toward helping them use high-efficiency, low emissions technology. USEA members have volunteered for over 25 years in 50 countries to do this. Lack of adequate energy poses national security concerns for all countries.

Domestically, our industry has undertaken a wide range of initiatives to reduce greenhouse gas emissions. We are very proud of our progress.

Electric power carbon dioxide emissions have declined 28 percent since 2005. Twenty-eight percent. We expect this trend to continue.

Methane emissions from natural gas have declined over 18 percent, even though we have increased natural gas production by over 50 percent in that same time period.

We have invested over $120 billion in greenhouse gas emissions-reducing technologies.

The solution to the dual challenges of climate change and global access to safe, reliable, affordable, and clean energy is technology. And an "all of the above" approach is necessary. Americans lead the world in innovation, and we can complete the energy revolution that began in earnest a decade ago. In the United States, increased U.S. domestic energy production has actually resulted in lower greenhouse gas emissions.

And we can continue to do this without additional regulations. We do not need the Clean Power Plan. We do not need the Paris Accord. We would rather pay the engineers and technicians to reduce emissions than to pay the lawyers to prove that we are in compliance with a needless regulation.

My written testimony cited the Chamber of Commerce's numbers on what the cost of complying with the Paris Accord would be.

Other countries are today expanding their consumption of fossil fuels. Coal mines are being build in Russia and China, and dozens of other countries. They are going to release greenhouse gas emissions for the next 50 to 60 years.

If we implement the Paris Accord, our economic competitors will access cheap energy while we force American consumers and industries to utilize high-priced energy.

I pose the question: do our competitors having access to cheap energy while we are paying more, is that a threat to our national security?

Thank you, Mr. Chairman.

[The prepared statement of Mr. Worthington follows:]

Testimony of
Barry K. Worthington
Executive Director, United States Energy Association

To the U.S. House of Representatives'
Committee on Foreign Affairs

"How Climate Change Threatens U.S. National Security"

April 2, 2019

Chairman Engel, Ranking Member McCaul, and Members of the Committee on Foreign Affairs.

My name is Barry Worthington. I am the Executive Director of the United States Energy Association. I have been in this role for 30 years.

The U.S. Energy Association helps expand energy infrastructure in developing countries with the U.S. Agency for International Development (USAID) and contributes to policy and technical discussions with the U.S. Department of Energy to expand the use of clean energy technology around the world.

Through our membership, USEA also represents more than 100 companies and associations across the U.S. energy sector, from the largest Fortune 500 companies to small energy consulting firms. Our members include energy production companies and energy efficiency companies, but also engineering, finance, legal, research and consulting organizations.

USEA's objective is to convey information about the realities of global energy issues in the 21st Century.

We are an educational association both by function and IRS tax status.

Thank you for inviting me to appear before you today.

My intent is to offer you information and observations and to convey an offer to be a resource for you and your staff as you begin to tackle the priorities of the 116th Congress.

The risks of climate change are real, and industrial activity around the globe impacts climate. Addressing climate change is a challenge for our country. It affects every world citizen.

While our industry addresses the changing climate, it continues to ensure American citizens have access to increasingly safe, affordable, reliable, and clean energy.

We have more than 1 billion global citizens with no access to commercial energy and another billion with inadequate access. Women in developing countries spend all day foraging for sticks and animal dung to generate energy for cooking, lighting, and heating. This is dangerous. Burning firewood and animal dung indoors kills children, causes asthma, and other health problems. Access to energy provides improved health, education, and economic development. Considering a global population growth of another two billion leaves the energy industry to provide 4 billion more energy consumers access by mid-century.

Our industry's challenge is to double the provision of energy services globally, while reducing greenhouse gas emissions.

Many of these new consumers will utilize fossil fuels because they are domestically available, abundant, and affordable. We should work harder toward helping them use high efficiency/low emissions technologies. USEA members have volunteered to do this for over 25 years in over 50 countries. Lack of adequate energy supplies poses national security concerns for all nations.

Domestically our industry has undertaken a wide range of initiatives to reduce greenhouse gas emissions. We are very proud of our progress.

For example, electric power carbon dioxide emissions declined 28% from 2005 to 2017. We expect this trend to continue.

Methane emissions from the natural gas industry declined by 18.6% from 1990 to 2015 even though U.S. natural gas production increased by more than 50%.

Since 2000, the energy industry has invested at least $120 billion in emissions-reducing technologies.

We think that the solution to the dual challenges of global climate change and global access to safe, reliable, affordable and clean energy is through technology.

An "all of the above" approach is essential. This means all the renewables such as solar, wind, hydro and geothermal, as well as traditional fuels and technology such as nuclear and all the fossil fuels. We need to work towards assuring that fossil fuel utilization uses high efficiency/low emissions technology including carbon capture and storage.

Americans lead the world in innovation and we can complete the energy revolution that began in earnest a decade ago. Increased U.S. domestic energy production has actually resulted in lower emissions of carbon dioxide.

And we can do this without additional regulation. We do not need the Clean Power Plan and we do not need the Paris Accord to achieve continued progress in our industry reducing greenhouse gas emissions.

We would rather pay the engineers and technicians to reduce emissions then to pay the lawyers to prove that we are in compliance with a needless regulatory regime.

And our citizens, society, and economy will pay. According to the US Chamber of Commerce Global Energy Institute, to meet the Paris Accord goals:

- U.S. GDP would plunge by $250 billion;
- the economy would shed 2.7 million jobs;
- the average household income would drop $160.

And to meet mid-century goals:

- GDP would be cut by nearly $3 trillion;
- industrial employment would fall by 6.5 million jobs;
- and average household income would drop $7,000.

We must continue to find ways to reduce emissions without suffering these hits to the economy.

And other countries are today expanding their consumption of fossil fuels. Coal mines and plants are being built in Russia and China and dozens of other countries. These plants will be releasing greenhouse gas emissions for 50 to 60 years.

If we implement the Paris Accord as it exists today, our economic competitors will be accessing cheap energy while we force American consumers and industries to utilize higher-priced energy. Does this threaten our national security?

Thank you, Mr. Chairman.

Thank you for your kind attention.

Mr. KEATING. Thank you. I would like to thank all the witnesses.

I will now recognize members for 5 minutes each to ask questions, starting with myself. All time yielded is only for the purpose of questioning the witnesses.

I agree that there will be many new consumers, but I also know there will be many new industries to come out of the green and renewable energy sources where it would be great for the U.S. to have a competitive advantage in these new industries as others are no longer as cost competitive.

But I would like to gear in on just the threats of specific countries perhaps with this important security issue. Climate change has been categorized as a threat multiplier which makes existing security risks even worse. Can you comment on how climate change impacts the challenges posed by Russia, China, Iran, and North Korea specifically?

Any witness that—Admiral McGinn.

Mr. MCGINN. It is a great expression, Mr. Chairman, to say that the effects of climate change act as a threat multiplier for instability. If you look especially around the world between the tropics, you will find many fragile societies, many fragile governments that pushed a little bit further by the effects of natural disasters or food shortages, water shortages, flooding, any of the disasters that we are seeing increasingly and more frequent will cause them to fail.

And into that failed state or society will rush all manner of bad people and bad effects. So, ultimately we see our young men and women in uniform now and in the future increasingly having to respond to those to protect the national security of the United States and our allies.

So, in all of the countries that you mentioned there are aspects of this that are—they are dealing with internally. But, importantly, on the international stage Russia and China will fill any gap in leadership that the United States leaves as it relates to climate change mitigation and climate change adaptation.

So, in fragile countries, fragile societies where China is making investment and increasing their resilience, that is something that the United States is losing.

Mr. KEATING. That has also been echoed by Secretary Hagel, Secretary Mattis. And do any other witnesses have any comments? Ms. Goodman.

Ms. GOODMAN. Mr. Keating, members of the committee, I think the clearest example is the Arctic. Today we have a whole new Ocean that has become navigable because of sea ice retreating, permafrost collapsing, and temperatures rising. Russia is militarizing its portion of the Arctic in order to prepare for a future where it can control routes across the Arctic, as I mentioned, as a toll road and an economic highway to its economic and security advantages.

China declared itself in 2018 to be a "near Arctic" stakeholder and has global ambitions in the region. It has declared that the sea routes across the Arctic are shorter than the current routes controlled by the United States through the Straits of Hormuz and the Straits of Malacca. And it will see advantage as those routes become increasingly navigable in the future.

So I think this is a very clear example of an area in which we have seen increased geo strategic competition.

Mr. KEATING. Just quickly, you know 40 percent of the world's population lives within 100 miles of our coasts. And that affects so many other issues as well. So, I know, Ms. Goodman, you have spoken to this, but could you speak to how climate change and ocean acidification could disrupt food stocks like fish stocks and fish migration, and what these risks would be imposed to coastal communities, and the implication it might have not on just food supply but on our national security?

Ms. GOODMAN. Yes, absolutely.

We are seeing changes in fish stock migration moving northward. Areas that were once very abundant becoming over-fished. Areas subject now to ocean acidification being less bountiful, but other areas further north and south in the poles becoming more abundant. That puts many of the communities in high intense urban areas in the mid latitudes at great risk, both across Asia and Africa, combined with extreme weather events from increased hurricanes, cyclones, and typhoons, which put many of these populations in increasingly fragile circumstances.

Mr. KEATING. Well, thank you.

I will now yield to the ranking member for questions. Mr. McCaul.

Mr. MCCAUL. Thank you, Mr. Chairman.

As I mentioned in my opening statement, I met with NASA scientists on this issue. They said, we are not policymakers, but we do want to show you what the data is reflecting.

And I think as, Ms. Goodman, you point out that Africa, where I am particularly concerned about extremism, will continue to get drier and increasingly lack water. Having said that, I want to focus on what is realistic, sensible, achievable, and pragmatic here.

President Obama pledged to cut greenhouse gases by 26 to 28 percent by 2025. Mr. Worthington, to your knowledge was the private sector, including the energy industry, consulted prior to this?

Mr. WORTHINGTON. To my knowledge there was no consultation with the energy industry.

Mr. MCCAUL. And do you know if the Administration released a cost-benefit analysis or any sort of economic analysis to justify the numbers?

Mr. WORTHINGTON. I have not seen any economic analysis relative to this issue that was done by the previous Administration, sir.

Mr. MCCAUL. Do you know how many countries' legislatures ratified this agreement?

Mr. WORTHINGTON. Many did. Not all, but many did. By far enough for the Paris Agreement to go into effect.

Mr. MCCAUL. And I guess that is why we are having this discussion here. This, this Congress did not.

Your organization did support President Trump's pledge to renegotiate the terms of the Paris Agreement. Other than just withdrawing or adjusting President Obama's terms, what terms of the agreement itself do you think could realistically in an achievable sense be renegotiated?

Mr. WORTHINGTON. Well, I think the biggest concern that we have as an industry is the notion that we do not have a level playing field with our economic competitors. Our commitment to reduce

greenhouse gas emissions by 28 percent has been met by the electric power sector in the United States. We have done that already.

The entire energy industry hasn't, and other parts of the economy that contribute to climate change. Agriculture, steel, cements, and so forth have not made the gains that we made in electric power.

But, you know, the Chinese commitment in the Paris Accord was basically that they would try. There was no percentage reduction insisted for China. They would, they would try. That was the best that they would commit to. So, in urging that the accord be renegotiated, we would like to see a level playing field where different countries around the world all had an opportunity to do the same type of emissions reduction that the United States was committed to.

Mr. MCCAUL. I think, and I think that is a good point. I mean, Admiral McGinn, Ms. Goodman, it is only as good as—you know, it is a piece of paper signed but it is only as good as the enforcement mechanism.

To Mr. Worthington's point, China is continuing to fire up a coal plant every week. And I would argue it is one of the biggest emitters of greenhouse gas.

Mr. MCGINN. Mr. McCaul, that fact, factoid of one power plant, coal fired power plant a week is, is old news. In fact, China has become one of the leadest—leading producers and exporters of green technology around the world. They did it for a variety of reasons. It could be argued whether or not tariffs was a factor there, but if you look at some of the major cities in China, and choking levels of air pollution, water pollution, land pollution, they see the imperative and they are living in many cases with the effects of climate change. And they recognize that they had to do something about it. And oh, by the way, that it was not a zero sum game. It was not, well, we can deal with climate change or we can have a strong economy. It is an "and" proposition.

And the United States can do that as well. The creation of jobs over the last 10 years, if you do not compare us versus them, but if you compare the number of jobs created in green industries from energy efficiency, to solar, to wind, every aspect of it is multiple times more than the jobs created in the fossil fuel industry.

Mr. MCCAUL. My time has run out. I know they have invested quite a bit in phototag technology and solar.

And, Ms. Goodman, do you have any comment?

Ms. GOODMAN. Thank you, Mr. McCaul.

I would argue that combating the climate challenge is not only about American leadership in the advanced energy transition, which is indeed extremely important, but it is also about American leadership in climate resilience, predictive analytics, and a whole range of advanced technologies that will enable us to have resilient economies for the future.

Energy is a piece of it, but there is quite a bit more in the built environment. And, as you have heard, I think also from scientists at NASA.

Mr. MCCAUL. That is very good.

I am going to close with—I had this discussion with Senator Lindsey Graham the other week. And he was talking about a Man-

hattan Project for clean energy. I think that is something that as we look at being productive here, instead of sparring in a partisan way, if we are trying to find solutions I think we should be looking at ideas like that as well.

With that, I yield back.

Chairman ENGEL [presiding]. Thank you. Thank you, Mr. McCaul.

Let me get right to the questions. Repeated national security strategies adopted during the Obama and Bush Administrations listed climate change as a key threat facing the United States. On December 18th, 2017, President Trump unveiled a national security strategy which omitted climate change as a threat.

So, let me ask Ms. Goodman and then Admiral McGinn, what are the consequences of striking climate change from our national security documents?

Why do not we start with Ms. Goodman.

Ms. GOODMAN. Thank you, Mr. Chairman.

The consequence is that it makes it more difficult for our national security professionals and our military leaders to openly address the risk today. Many have spoken about it directly. And, it also makes it more challenging for American climate leadership to measure up to the other global leadership we believe is so important.

This is a fundamental security challenge of our era. And only by being present and exerting our leadership will we be able to recognize and address those threats in a commensurate manner.

Chairman ENGEL. Thank you.

Admiral McGinn, based on your time in uniform, how do you think the military as an institution sees climate change?

Mr. MCGINN. I believe they see it, I know they see it as a tremendous challenge and a growing challenge, Mr. Chairman. And, ultimately, people in uniform are pragmatists. You cannot debate whether the intelligence about a mine field at sea or shore or whatever is supported by 75 percent of the intelligence, or 90 percent, or 10 percent, you act on what you know and what your best judgment tells you.

And in our military, especially among our most senior military leaders who are on record talking about climate change as a significant growing national security challenge, they are saying we need to do something about it. We are doing something about it. And I think all the support that they can possibly get to do those things from the Congress is absolutely essential.

Chairman ENGEL. Thank you.

According to media reports, Cyclone Idai in Mozambique left nearly 2 million people in need of assistance. U.N. Secretary-General Antonio Guterres, with whom we met, called it "an uncommonly fierce and prolonged storm, and yet another alarm bell about the dangers of climate change."

Mr. Weisenfeld, how do increasing humanitarian emergencies caused by climate change affect how we provide development assistance to make communities more resilient?

Mr. WEISENFELD. Thank you very much, Mr. Chairman, for the question.

I think the recent events in Mozambique highlight the impact of extreme weather events and climate change on communities and countries with limited resources to deal with these kinds of challenges, and countries that are often prone to conflict. And we have seen devastating results of the cyclone in Mozambique. As you have said, it has spilled over into neighboring countries, into Zimbabwe for instance, where I had the pleasure to serve.

Throughout my career I have seen that where there are crises like the cyclone in Mozambique, where there are crises like the earthquake in Haiti, the American people are extraordinarily generous and want to reach out and support vulnerable communities and respond to suffering. And that is something that I know will continue.

But it is always much better, much more cost effective to get ahead of these problems. My fellow panelist Ms. Goodman has talked about the predictive analytic capabilities that are available these days, and having a better understanding of what is likely to happen and what kinds of preventive measures in terms of better construction, in terms of understanding how to manage water flow better, to limit the kinds of impacts that we are seeing around the world is something that requires strong investment. It requires sustained investment and, importantly U.S. leadership.

We do have the tools. And we have the ability to get ahead of some of these problems in a much more cost effective way. Foreign assistance has shown that it is good value for money in providing preventative care, as opposed to the large expense of responses that are necessitated by those kind of humanitarian tragedies.

Chairman ENGEL. Thank you.

China is leading a global shift toward renewable energy. And for the third year in a row China has ranked first in the EY's renewable energy attractiveness ratings. It invested $126 billion in 2018, which is three times that of the United States. It plans to invest nearly $360 billion by 2020, and an estimated $6 trillion by 2030. China is not only increasing domestic renewable investments but also extending investments into foreign countries, helping stimulate the global economy, and spreading its global influence.

And we see this all over the world. But it is particularly troubling to see what China is doing vis-a-vis what we are doing.

So let me again ask Ms. Goodman, and also Admiral McGinn, can you elaborate on the response China has had to climate change? Admiral, why do not we start with you.

Mr. MCGINN. In developing countries in Africa, Southeast Asia, China is there on the ground in many of them, obviously for their own strategic geopolitical purposes, but they are making investments in industries that relate to clean energy. They are making investments that increase resilience of those, those countries.

And as was noted just a moment ago, a tremendous amount of the population of the Earth live very close to the oceans. And that makes them subject to sea level rise. But, importantly, it makes in the near term, it makes them subject to tidal surges, typhoons or hurricanes. And anything that can be done by a global leader like China, like the United States, that increases the resilience is an investment in the future.

Chairman ENGEL. Thank you. Ms. Goodman.

Ms. GOODMAN. Thank you, Mr. Chairman.

China is on a global quest for resources to feed and power its domestic economy but also to expand its global influence. We see this across Africa, and throughout Asia and South America. We see this with increasing extraction of energy and mineral resources, and fish stocks, but also increasing foreign direct investment in countries from the Arctic to Africa and Asia that provide not only resources back home but leverage into economies of other countries for which American leadership needs to be present to counter that influence.

Chairman ENGEL. Thank you very much. I appreciate your testimony.

Mr. SMITH.

Mr. SMITH. Thank you very much, Mr. Chairman.

Mr. Weisenfeld, in your testimony you reference neglected tropical diseases, or NTDs, and you are focused on the need to have a holistic approach to development. Along with my colleagues Congresswoman Karen Bass and Congressman Greg Meeks of New York, I have introduced a bill, H.R. 826, that seeks to address NTDs. So I am particularly grateful for your and RTI's commitment to fight NTDs.

And respectfully would ask that the chairman, our good friend Eliot Engel, look to mark this bill up ASAP. It has passed in this committee in the past, but then ran into some snags along the way. But my hope is that we take another shot at it this year, and soon, and could make a huge difference.

But I would like to ask with regards to this particular hearing, with respect to global health: can you describe how climate change affects diseases of poverty, such as NTDs, especially in fragile States?

And, second, how do intestinal worms in particular heighten susceptibility to co-infection, particularly among food insecure or malnourished people?

Mr. WEISENFELD. Thank you very much for that question, Congressman. And thank you for mentioning the Neglected Tropical Disease program, the NTD program. RTI is extraordinarily proud, of being one of the organizations helping to implement the programs to eliminate neglected tropical diseases worldwide. We are very grateful for your leadership and the committee's leadership in supporting those efforts.

As people may know, neglected tropical disease are diseases that blind, disfigure, and disable people around the world. The programs that this committee has supported have protected over a billion people worldwide from those diseases.

They are also a great example of how strong U.S. leadership and focused programming could have a tremendous impact in moving countries toward resilience and self-reliance, as USAID Administrator Green says.

The Neglected Tropical Disease programs are programs that have actually eliminated diseases as a public health threat from many countries in Africa, Asia, and Latin America. Those are the kinds of successes that you do not easily see every day in development.

So, again, we thank the committee for its leadership. And we are proud to be a part of it.

Regarding your question, I think one of the worries that we see around the world is that, as you see increased temperatures and extreme weather events, we are seeing the spread of diseases, particularly around increased temperatures. Rising temperatures allow for the expansion of diseases because they expand the range of insect vectors of disease, the range for mosquitoes, the range for parasites. So, you are seeing increased vectors for malaria, for chikungunya, for dengue, diseases that are in some cases fatal diseases that can really harm individuals. They affect the livelihoods of communities and families. They have a negative impact on overall economies. These diseases also affect not only humans but plants and animals. So they affect the larger food supply as well.

Regarding your question on worms. One of the series of neglected tropical diseases is soil-transmitted helminths. We see an increase in that when people's immune systems are compromised, and in situations like the floods in Mozambique, or in the countries that are suffering from famine—in the last couple of years we have seen famine risks in Nigeria, South Sudan, Yemen, and Somalia. Where people do not have enough to eat, where they do not have enough to drink, where you see increased risk of cholera, it compromises the immune system and makes people much more susceptible to the potential for co-infections.

Mr. SMITH. I appreciate that. Thank you very much.

You know, I was the House sponsor of the Global Food Security Act. It passed the House three times. It did become law. And Betty McCollum was our chief co-sponsor, did a wonderful bipartisan effort on that. But I have always been concerned, I mean, I have seen the worms. As you know, since there are 1.4 billion people walking around with parasites and worms, seems to me that we need to do more on that. And our bill will certainly take us in that direction.

But thank you for showing the correlation, if you will, between the two.

Very little time left. But there is a great deal of support in this committee and in the Congress, bipartisan support, for Power Africa what are we doing to exacerbate or—is it neutral when it comes to concerns about climate change? How would you respond to it?

Maybe, Admiral, you want to, or someone else.

Mr. MCGINN. I think we can do more. We are doing a lot basically driven by global terrorism, if you will, which finds some of its origins in North Africa in particular. But I think that we can do more in terms of working with the militaries and the national security organizations of those countries and showing them ways that they can become more resilient. More resilient to food shortages, or water shortages, or sea level rise, or tidal surges.

And that is a gift that lasts for literally generations and changes people's lives. Clearly we are going to be there when there is a major humanitarian disaster. But being able to make those countries more resilient has a lasting effect. And our whole national security apparatus, not just the military but organizations like USAID can play a tremendous role in increasing the resilience of those countries.

Mr. SMITH. I am nearly out of time. But perhaps later on or for the record you can provide it, because I am talking about the electrical grid especially, to make sure that we are doing the right thing in terms of build-out.

Chairman ENGEL. Thank you, Mr. Smith.

Mr. SHERMAN.

Mr. SHERMAN. Thank you. We have focused a lot on the physical effects of global warming and climate change. But there is also the reputational risk that we face being the one country that does not even pretend to be doing our share to try to stop it, at least not at the national level. Our hearing today is on national security. We can learn from the past.

In World War I and World War II the winner was not necessarily the strongest country but rather the strongest alliance. For 70 years the United States has been the unquestioned leader of the most powerful alliance or network of alliances the world has ever seen. Now we have renounced the Paris climate change talks. We have announced that we won't do our agreed share.

What effect does that have on our overall ability to hold together these alliances? Admiral?

Mr. MCGINN. I think it is a question, Mr. Chairman, of leadership and leadership by example. We are judged by what we do, not just by what we say. And we need to continue to be that global force for good that you pointed out has existed for over 70 years since the devastation of World War

And as you also pointed out, it is not just any one country or any one nation, it is an alliance of nations that come together around economic and democratic political values that are going to prevail against this newest challenge, this global existential challenge of climate change.

Mr. SHERMAN. And I would point out our allies are democracies. So just having a few leaders at the top saying, "Well, we understand," does not measure the effect that this has long term on populations that will be there long after this or that leader leaves.

Ms. Goodman, do you have any comment on how this affects our ability to keep the Alliances that have underlied, that have girded our national security?

Ms. GOODMAN. Thank you, Mr. Sherman. I would observe that this week we are observing the 70th anniversary of the NATO Alliance, which has been foundational to American security during that period. I grew up during the cold war and spent my early years working on NATO matters and nuclear security as the fundamental security challenges of our era.

I believe that climate change poses an equally fundamental security challenge today, and that American leadership, in conjunction with our allies and partners, is as fundamental to this challenge as it has been within NATO and to fighting the challenge that we face.

Mr. SHERMAN. Thank you. I want to move on to one other issue, and that is China. They are subsidizing the export of panels, but they subsidize any manufactured good that they think is going to be relevant to the future, and they do that for their own economic interests, sometimes driving down industries in places like the United States.

When it comes to climate change, they seem to be much less interested than in smog and particulate matter. And, of course, climate change, the effect of whatever you do is worldwide. They seem to focus on the very severe problems that they have breathing the air in their own cities. Now, China emits twice as much greenhouse gases as the United States. Of course, they have four times the population.

They announced with pageantry that they are going to keep increasing their greenhouse gases right up until 2033—2030, and then we will see what happens after that.

Other than reaffirm our own commitments in Paris, what can we do to get China to do more? I believe we have decreased our greenhouse gas emissions; they are increasing theirs.

Mr. Weisenfeld, do you have a—which on the panel has a response? Looks like the admiral has a response.

Mr. MCGINN. I believe that we can compete so much more competitive—we can be so much more competitive in this energy transition from primary dependence on fossil fuel which, oh by the way, has been very, very good to the United States for over 100 years. But now is the time to change.

And the opportunity to change exists in our great technology, in our universities, in our business models. There is tremendous amount of capital that is waiting to be invested in this energy transition. And I think that that is one of the best ways that we can influence the behavior of China, by us producing ways in which they can maintain their quality of life, their economic growth, and in fact everybody can, but doing it with good technology and business models.

Mr. SHERMAN. I will point out that I look forward to the day when there are more than a couple of vehicle recharging stations in the Rayburn garage. And I yield back.

Chairman ENGEL. Thank you, Mr. Sherman.

Mr. PERRY.

Mr. PERRY. Thank you, Mr. Chairman. Ladies and gentlemen, thank you for being here.

Mr. Weisenfeld, just curious, talking about natural disasters with some component of climate change in the mix there, are you familiar with the numbers over the last decade of deaths per 100,000 based on natural disasters? Is it going up generally or going down?

Mr. WEISENFELD. I am not familiar with that data at the moment.

Mr. PERRY. OK.

Mr. WEISENFELD. But I can look into it and get back to the Congress.

Mr. PERRY. I am a little familiar. And so I just want to, because all the stuff that is important to us is policy measures, trying to get the policies right. But it has gone down dramatically, dramatically per 100,000 over the last, over the last 100 years. And just in case you are interested or the audience is interested, most of the deaths occur from earthquake as opposed to flood, or drought, or hurricane, or something like that.

So, when we talk about getting this policy right, all that stuff has to be considered. We do not want to just assume that natural disaster is occurring as a component of climate change and causing

more deaths than they have in the past because that in fact is not the case.

Mr. Worthington, the United States, as you know, has a vast amount of traditional resources. And under this, under this president, an energy dominance strategy associated with that. And I just want to get your thoughts on the World Bank's notable finding that China enjoys dominance in the arena of metal and rare earth metals in particular, which are required in many cases to supply the technologies for a carbon-restrained or constrained future.

From a national security standpoint, I mean, are we, are we playing right into China's hands by eschewing what we have in our country, literally hundreds of years of resources at our, at our availability, and into an economy based on what they have essentially, they dominated, dominating and continue to seek to be dominant in?

Mr. WORTHINGTON. Thank you for that question, sir.

There is evidence that exists that would suggest that we have traded our reliance on Mideast oil to a reliance on rare earth elements in China. And there is plenty of evidence that that is actually what has happened and is continuing to happen.

We do have abundant domestic resources. By increasing our domestic fossil energy production, that has actually allowed us to reduce our CO2 emissions in the United States. And the notion that we should become dependent on China, or any other country for that matter, on rare earth elements is just a road that we should not be going down. But, nevertheless, that is the road that we are going down right now.

Mr. PERRY. So, as a general, if we recognize that and generally agree, what is the solution set for America? Does the solution set include more involvement in rare earth mineral rights and industries? Or is it, is it reliance more on what we currently have in our country? Or is it a combination of the two? What should our strategy be vis-a-vis our probably greatest geopolitical adversary?

Mr. WORTHINGTON. Well, like so many other aspects of the economy, diversity is a key strength. And we need to develop rare earth elements here in the United States. There are abundant supplies of rare earth in coal, for example, and that can be byproducts of mining coal.

We also need to work with other countries that have resources that are other than China to help them develop their rare earth element resources as well.

Mr. PERRY. Is this something that we have constrained ourselves to, or is there something that stops us from developing the rare earth industry in the United States and abroad on behalf of the United States?

Mr. WORTHINGTON. I do not think it was a deliberate policy decision. I think we kind of blundered down this path because, you know, China is cheap. And so we, instead of developing our own resources we kind of got seduced into a set of circumstances where we are buying on the cheap, and that means buying from China.

Mr. PERRY. All right. Thank you, Mr. Chairman. I yield.

Chairman ENGEL. Thank you, Mr. Perry.

Ms. TITUS.

Ms. TITUS. Thank you, Mr. Chairman. Thank you for holding this hearing. I am most impressed by the witnesses. I really want to thank Ms. Goodman and the Admiral for signing onto the letter to the president on this topic. I share your concerns. I think he is moving us absolutely in the wrong direction, not only by pulling out of the Paris Climate Accords but by not recognizing climate change in the national security strategy.

We have heard a lot this morning about how climate change is a threat multiplier, and it has been mostly in relation to China and Russia. But I would like to talk about those fragile States and how they become vulnerable to terrorist recruitment. We have seen a lot of evidence, and I will ask you to comment on some of this, where areas that are, their lives, people's lives are upset by lack of water, lack of food, just general instability, people are ripe for recruitment.

We have seen this in Iraq with ISIS. We have seen it in the Lake Chad area with Boko Haram. We have seen it across the Sahel in Mali, Islamic groups there have used that instability to provide resources and to encourage people to join their side because they can address these issues. Would you say that that is accurate? Do you have, have you seen other examples of this?

And do we consider the impact of climate change enough as we try to develop a strategy to deal with terrorist recruitment around the world? I would ask the admiral and Ms. Goodman to start with that.

Mr. MCGINN. Well, as you know, around the world there are many, many divisions along, that have been there for centuries in some cases: economic divisions, cultural, religious, political. And what the effects of climate change do is it puts a magnifying glass over some of those divisions so that when you have a societal crisis like food shortage or water shortage or a major natural disaster, that just exacerbates the situation and causes those divisions to escalate to the point of armed conflict in many cases, which can spread to even regional conflict.

So, recognizing that this pressure on fragile societies and fragile governments will cause many of them to fail, are there some things that we can do to increase their resilience so that they are not as dependent on one aspect of coastal farming, for example, in Bangladesh. Or that if, not if but when the next typhoon strikes there is going to be an ability to evacuate people to higher ground so that you can avoid the kind of mass migration toward India that could cause a major regional problem.

So there are—I would say the word that we need to focus on, how can we help nations help themselves to become more resilient and recognize that if they are only one drought away, or one flood away from a major immigration crisis, we need to figure out how can we prevent that from happening, or how can we mitigate its effects.

Ms. TITUS. Ms. Goodman, would you talk about terrorist recruitment?

Ms. GOODMAN. Yes. The violent extremist organizations like Boko Haram, ISIS, and others are essentially weaponizing water and food, holding vulnerable populations at risk, as hostages in certain circumstances, to their own advantage. And ,that is exacer-

bated because of the increasing drought that is displacing people in some of these regions across the Sahel and parts of the Middle East.

As a result, they can thrive on the additional insecurities created within communities when regions in, for example, the Lake Chad region, which has shrunk so much over the last decades, can no longer support the fishing, the farming, and the herding populations, because of the decline in available water and other resources in the region.

So this is happening. There are opportunities I think through our own efforts, for example, through Power Africa, Feed the Future, our work with allies and partners across the region, to make these communities more resilient and to be able to withstand some of these shocks and effects.

Ms. TITUS. Related to that, as you brought up, Admiral, you know, environmental changes cause ecological changes, cause demographic changes. And that often comes through migration. And you see that with the Rohingya. And it seems to me this just feeds into these problems.

Mr. MCGINN. One of the most dramatic examples, and it is a present generation geopolitical challenge, is what happened and is happening in Syria. You can trace the roots of that back to all those cultural, economic, political, religious divides that I mentioned before. But when you have a long-term drought as Syria experienced over the past 5 to 10 years, that cause migration to cities because the ability to live on the land that they had previously been living on for decades and, in some cases, centuries was taken away. And it just put that magnifying glass on all of those divisions and it exploded into civil war.

And I am not trying to make the case that climate change is the direct cause, but it certainly is a significant indirect cause for the kind of strife that we deal with the tremendous consequences of, including cross-border migration, terrorism, all of those violent organizations that Ms. Goodman mentioned.

Ms. TITUS. Thank you. Thank you, Mr. Chairman.

Chairman ENGEL. Thank you, Ms. Titus.

Mr. YOHO.

Mr. YOHO. Thank you, Mr. Chairman. Good to see you back. I appreciate the panelists here.

And, you know, a discussion on climate change and national security I think is something that we need to have. But I think it is something we need to keep in perspective. If we look at all things that are affecting America or our security, where would you rank climate change when you rank it with debt, China, cyber security, theft of intellectual property? As Mr. Worthington pointed out, 100 percent of our rare earth metals we are dependent on China. 90 percent directly come from China, the other 10 percent come from countries that get it from China. And, you know, we can go on to polarization of politics.

So, where does climate change fit in there? Where would you rank it?

Mr. MCGINN. It is right near the top. I am not trying to make a case that it is the most compelling, but in terms of the broadness and the depth of its implications for us today and going forward,

it is a very, very serious challenge for our Nation economically, environmentally, and in terms of energy.

In terms of the rare earth dependence, we have got an ability in this country with the kind of universities and business that we have, the technologies that we are developing, to make rare earth elements less of a challenge by developing other means of storing energy, et cetera.

Mr. YOHO. I am going to cut you off there.

Mr. MCGINN. Yes.

Mr. YOHO. Because I agree with you. And we have got a bill that we are putting in, a rare earth and critical minerals bill that we have a national stockpile 2 to 3, or 3 to 5 years out there that we can readily access. I am not saying we have to extract it right now. But we need to know where it is, and we will go after it when we need it for national security reasons.

I am going to ask the panel here because, Ms. Goodman, you brought up, you stated that climate change has led to the mass migrations. Is that correct?

Ms. GOODMAN. Climate change is a factor in the mig——

Mr. YOHO. OK.

Ms. GOODMAN. —in the vast migration flows that we have seen.

Mr. YOHO. How many people, do you have any estimate of how many people have been displaced by climate change, out of the 70 million from the Middle East, Asia Pacific region? What percent would you say is climate change related?

Ms. GOODMAN. I think the way to think about it, Congressman, is that the factors we have discussed of extreme weather events, sea level rise, temperature rise, increased drought, and water scarcity are exacerbating the reasons that people move.

Mr. YOHO. All right. When I look at the water map of Africa, there is plenty of groundwater there. What we see so often is the inability of governments to respond, or governments cause the problem. And as you pointed out, Boko Haram and these other terrorist organizations will use anything they can to leverage people.

Ms. GOODMAN. Uh-huh.

Mr. YOHO. And that they do that when we give U.S. aid relief, whether it is food, whatever it is, they hold that. And we see what is going on in Venezuela, that is not a climate change condition. That is bad politics.

Ms. GOODMAN. Exactly.

Mr. YOHO. And so to say that, you know, you know, I hear that we are not leading, I agree with Chairman McCaul stating that, you know, we pulled out of the Paris Climate Accord, and I am glad President Trump had the leadership to do that because it was a piece of paper that bound this Nation, whereas other nations like China or India says, well, we will try. You know, and that is at the expense of the American population.

And if you look at from 2005 to 2017, the U.S. economy grew by 20 percent while our energy consumption fell by 2 percent. Energy-related CO2 emissions also decreased during that time period from 2005 to 2017, it dropped 14 percent. That is leadership. If the rest of the world would follow what we do instead of us going after the—you know, and the politics that gets played over climate change I think is damaging this country.

I think we need to look at it. We need to look at all energy sources. You know, Chairman, Mr. Keating stated out that, you know, we pulled out of the Paris climate change and this was terrible, yet, in Cape Cod where I assume you are up in that area, too, Massachusetts, they cannot get to Cape Cod wind farm because it says year-round and summer residents expressed concerns over the location of the project. Some claimed that the project will ruin scenic views from people's private property as well as the view of public property, and that it would interfere with yachting.

So, if they are really serious about this, build the dang wind farms and do not, you know, do not say "not in my backyard."

So, I think we should look at it strategically. I think the warming of the Arctic is very serious because China is wanting to lay claim in there because they say, well, we are near territory. Those are the things that I see, and it is not following the international norms that we need to stand up against China and back them off now. If not, they are going to have bases up there. They are going to be extracting energy. And they are going—I mean, you look at what they did in the South China Sea and tore up 4,000 acres of coral rock, that has got to be bad for the climate, too. But nobody says a word to China.

I am out of time. And I am sorry I did not get to ask much of a question. I am just angry. See ya.

Chairman ENGEL. Thank you, Mr. Yoho.

Ms. SPANBERGER.

Ms. SPANBERGER. Thank you, Mr. Chairman. Thank you very much to our witnesses for being here today.

Ms. Goodman, I would like to ask a quick question just for some level setting for people here on this committee hearing. Related to the Paris Accord, it is my understanding that the Paris Accord did not bind our actions, the actions of the United States. Is that correct?

Ms. GOODMAN. Yes, that is correct. Each country sets it own nationally determined commitments.

Ms. SPANBERGER. So, to confirm, we, the United States of America, submitted the goals that we thought were appropriate for us and the goals that we wanted to, to achieve into the future. Is that correct?

Ms. GOODMAN. Yes.

Ms. SPANBERGER. Thank you, ma'am.

So, to draw from that a little bit further, my question is how much benefit is the U.S. receiving from the continued dedication of our European allies and U.N. member States who still are committed to the Paris Accords and their climate change actions?

And then, separately, what risks are we taking in your assessment by not being party to these agreements any longer?

Ms. GOODMAN. Well, I think the risks that we are taking are the continued license for China, Russia, and other great powers of this age to meddle further in our own American interests and with our allies and partners. We see that particularly across Europe today. We see increasing leverage of both Chinese foreign direct investment and Russian energy across Europe. And, without a strong American presence and American leadership, both within the

NATO Alliance and on climate leadership, we put our own security at risk.

Ms. SPANBERGER. Thank you. And would any of the other witnesses want to add anything to that question?

Mr. MCGINN. I would just say the phrase "leadership by example." The United States has been a force for good, and continues to be. And anything that we do that undermines our own credibility by not acting in a way that a global leader needs to act to be that continuing force for good is detrimental.

Ms. SPANBERGER. Thank you very much. Mr. Worthington?

Mr. WORTHINGTON. Yes. Let me just say that there is not a single European country who is on track to meet their commitments under the Paris Accord.

Ms. SPANBERGER. So, given that they are not on track to meet their commitments, do you assess that that is a reason to abandon commitments and efforts to achieve them?

Mr. WORTHINGTON. No. That is not what I said. I did mention in my testimony that our energy industry, particularly electric power, has achieved a 28 percent reduction in CO2 emissions. There is only one other country in the world that can claim that.

Emissions in Germany are going up. The use of coal-fired power in Germany is increasing, not decreasing.

Ms. SPANBERGER. So then what, in your assessment, sir, would be the fact that our European allies remain committed to the Paris Accord, what benefit then do we receive because of their continued commitment.

Mr. WORTHINGTON. Their continued commitment of talking is not reaching their, their commitment. They are, they are not delivering on what they are talking about. They publicly, verbally, and in writing will make commitments to reduce emissions. Their reality is they are not reducing emissions, they are increasing emissions.

Ms. SPANBERGER. Would any of the other witnesses care to comment on that? Thank you, Ms. Goodman.

Ms. GOODMAN. I think the right analogy here is within the NATO Alliance for 70 years, that alliance has enabled Europe and America to be whole and free and to spread the values and norms in a globally constructive and productive manner for our economies and our people. We have at various times taken our European allies to account for not fully meeting their financial commitments within the Alliance. That is a continuing burden-sharing discussion. It does not mean we do not value the Alliance, and the commitment and the leadership.

And, I would say here we are going to have, within the climate community there is going to continue to be, debates about the right levels of commitment and who is living up to their individual nationally-determined commitments. Those are reasonable to have at any given time. It does not obviate the need for the overall commitment to address the climate challenge.

Ms. SPANBERGER. Thank you. And in some of the discussions here today when talking about the national security threats to global climate change and the fact that when there is a vacuum in times of extreme weather events we will see that vacuum filled by someone, if not good positive actors such as the United States or aid agencies. I think the same is relevant to what you were saying,

Ms. Goodman, that in the absence of U.S. leadership someone else will be stepping in. And I think that is to our future detriment.

Thank you for your testimony. I yield back.

Chairman ENGEL. Thank you, Ms. Spanberger.

Mr. ZELDIN.

Mr. ZELDIN. Thank you, Mr. Chairman.

Continuing the conversation on the Paris climate agreement, if, Mr. Worthington, if the United States was to remain in the Paris Agreement past 2020, can you speak to what role the executive branch should play in consulting with the private sector and Congress on responsible greenhouse gas reduction targets? And should it publicly produce its economic analysis and cost-benefit conclusions?

Mr. WORTHINGTON. I think that is correct. I think that we have not been part of the discussions during the last administration as to what we should try to do relative to climate.

As I mentioned, we have received or achieved remarkable reductions in greenhouse gas emissions in the energy industry. We were, we were not doing that because of the Paris Accord, we were doing it for whole variety of other, of other reasons, including our customers, our employees, our shareholders. Everyone wants us to reduce emissions, so we are reducing emissions.

If the Paris Accord were to be renegotiated, we would very much like as an industry, to have a seat at the table to discuss how that might be best achieved.

Mr. ZELDIN. Thank you to all the witnesses for being here. Do any of you believe that President Obama should not have submitted it to the Senate for ratification? Do any of the witnesses disagree with the statement that President Obama should have submitted it to the Senate for ratification?

Mr. MCGINN. Military, not political.

Mr. ZELDIN. Anybody else want to weigh in? OK.

China is the world's largest greenhouse gas emitter. What were China's commitments under the Paris Agreement? And can you speak to Beijing, whether or not they are living up to their commitments?

Mr. WORTHINGTON. The Chinese commitment was to try. That they would, they would basically try to reduce emissions. There was no commitment any further than that.

And I will add that, you know, recognize that today China is building over half of the coal plants that are under construction in the world today, about half of them in China, and about half in other countries. And part of the reason for that, we have heard discussion where if the U.S. steps back from the leadership role someone else will step in.

Well, the United States stepped back from a leadership role in terms of helping developing countries develop their fossil energy resources. The World Bank stepped back, largely at the urging of the prior U.S. administration. And as a consequence of that, all through Africa and parts of Asia you see the Chinese companies building coal-fired power plants only to the standards that they believe is relevant, which means essentially no standard at all.

If we had endured in U.S. leadership instead of allowing that vacuum to occur, we could be seeing these facilities being built, but

built to standards that are modern, that are responsible environmentally, and responsible in a climate context. Instead, we stepped back and allowed that vacuum to be filled by the Chinese.

Mr. ZELDIN. One of the debates that we will have in Congress on this topic and out of Congress is a regulatory approach versus a market-based approach. If any of the witnesses can speak to the role of technology and innovation in reducing greenhouse gas emissions?

Mr. MCGINN. I served as a director on the Electric Power Research Institute. And the membership of EPRI is primarily utilities of all sorts, rural electric co-ops to investor-owned, to public utilities. And the private sector is significantly engaged in trying to produce ever cleaner, more reliable electricity, and to apply that electricity in places like transportation, for example, and commercial and industrial activities where we have not had the technology to be able to do that.

So, in my experience the private sector in many cases, because of their customers or their work force, the motivation to not just have safe, reliable, affordable, but also clean electricity delivered is really, really driving the industry in a very, very positive direction.

And I think that a lot of the greenhouse gas reductions that were cited earlier came about as a result of efforts in the, in the utility business. Some of them were self-motivated, many of them were because of regulation and policy that produced a positive effect.

So it is a matter of achieving that, that good balance.

Mr. ZELDIN. Thank you for your service, Admiral. I am out of time so I will have to yield back.

Mr. COSTA. [presiding.} The gentleman's time has expired. I will now recognize the gentleman from Florida, Mr. Ted Deutch.

Mr. DEUTCH. Thanks, Mr. Chairman. Thanks to the really terrific panel for being here. Thanks for your service to our Nation.

We are on the brink, as we have been discussing here this morning, of major global catastrophes caused by climate change. Sea levels are rising, threatening coastal communities; warmer bodies of water are feeding stronger storms, like Hurricane Michael that intensified rapidly into one of the strongest ones in our history; droughts are affecting crop production; shorter winters will displace wildlife and impact cold weather tourism.

You said earlier, Admiral McGinn, you talked about Camp LeJeune and Norfolk, but these troubling signs are also impacting my community in South Florida. Rising sea levels threaten the Coast Guard facility at Port Everglades. In Miami the rate of rising sea levels is outpacing global rate by nearly tenfold. In Miami Beach the resiliency projects already underway cost over $500 million to raise roads and improve drainage systems. But worsening flooding during the annual king tides, the highest tides of the year, is threatening now even inland communities.

Unfortunately, this Administration has shown little interest or willingness to take any action. I founded the bipartisan Climate Solutions Caucus in Congress to serve as the first form for rank and file Democrats and Republicans to sit together to discuss how these events will devaState our Nation. Last Congress we had 88 members, split evenly between the two parties. The size of the caucus

and the regional diversity of the members reflects the growing recognition of climate change affecting regions all across the country.

I particularly would like to recognize my Republican colleagues on this committee, Representative Rooney, the co-chair of the Climate Solutions Caucus in this Congress, and Representatives Fitzpatrick, Kinzinger, Mast, and Zeldin for serving on the caucus. We hope that this Congress the caucus will play a more active role in actually getting things done.

The caucus recognizes that climate change is not just a threat to the U.S. but a threat to the world. To prolong drought, food shortages, bigger and more devastating storms, the spread of diseases, can undermine stability, as we have heard this morning.

The world needs to prepare for refugees fleeing from countries that will no longer be habitable due to the impacts of climate change. We watched as Cyclone Idai devastated Southeastern Africa, flooding hundreds of square miles, damaging Mozambique, Zimbabwe, and Malawi. Thousands could be dead, and cholera cases now exceed 1,000.

And a drought in 2018 almost caused Cape Town, South Africa to literally run out of water.

In the absence of Administration action, Congress must step up to act. Americans of all political stripes acknowledge climate change and expect their government to do something, something that will actually reduce greenhouse gas emissions, something that will seriously address climate change. And I hope that this Congress we will do that.

Admiral McGinn, DoD and intelligence officials have explained how climate change forces our military to adjust strategy and policy. There have been references that a number of you have made to Russia and China. I would like to, I would to just spend a minute addressing whether China and Russia face these same challenges. You have spoken about the opportunities to them, particularly on the Arctic Circle, but how is climate change affecting our military's security interests?

Mr. MCGINN. China and Russia both face internal challenges of climate change. It is, as you know, it is a global, a global phenomenon, a global threat.

Our military is being called upon more frequently because of the natural disasters that are caused by Mother Nature. But I think that our ability to operate out of our bases here in the United States, as well as overseas, is increasingly going to be impacted.

You mentioned Hurricane Michael and what happened Tyndall Air Force Base, Hurricane Florence coming up the Eastern Seaboard and the devastation it wrought on Camp Lejeune, prior year hurricanes in South Carolina at Paris Island. And the list goes on. So, I think that our investment in resilience and recognizing that our military needs these platforms to launch American power down range, and to be able to be effective in all of the emissions is absolutely necessary for investment.

Mr. DEUTCH. Thanks.

Ms. Goodman, actually let me, let me ask you about something that we have talked about in this committee before and the research that environmental stresses did not cause the Arab uprising in 2011, but the impacts of climate change may have served to in-

crease the likelihood of instability. Can you elaborate and provide an example of how climate change has undermined stability in the Middle East?

Ms. GOODMAN. Well, in Syria in the years preceding the deadly conflict, there was a prolonged drought. And, that drought drove farmers and herders that had lived peaceably in the rural areas to abandon some of those rural areas and move, or migrate, toward cities. That created civil unrest as the cities were unable to accommodate those people, and that enabled extremist forces to move in.

So, the drought is directly connected to the onset of the civil unrest and the increasing violence. It is not the only factor, but it is an exacerbating factor.

And, if I might add in response to the last question, climate change is degrading military readiness in the United States today, as we see our bases and stagings increasingly at risk from extreme weather events—which cost over $5 billion now to rebuild both Tyndall and Camp LeJeune—and also the floods recently across the Midwest affecting StratCom and Omaha. And, not to mention the regular sunny day flooding that occurs in Norfolk as well as in your region in Miami. This is a very significant effect on our military.

Mr. DEUTCH. Thank you.

Mr. COSTA. We thank you for your response. And the gentleman's time is expired.

And the Chair will now recognize Susan Wild, the gentlewoman from Pennsylvania for 5 minutes.

Ms. WILD. Thank you, Mr. Chair.

I am one of those people that believes that the American military is uniquely qualified and capable of working on real climate solutions. And I would just first like to know whether all of you agree with me on that or disagree?

Mr. MCGINN. Agree.

Ms. WILD. I guess, and I am seeing nodding of the head. So what I would really like to see is some sort of directive to our military operations that climate change is something that we need the military to proactively work on and to assist the rest of the world in coming to solutions. And I understand to some extent that is happening.

Ms. Goodman, could you tell us something about what initiatives the U.S. military is engaging in now or planning to undertake in the future to combat climate change?

Ms. GOODMAN. Thank you, Congresswoman.

I would start from the assumption that the military's mission is to provide the most effective and capable fighting force in the world and for the United States. So the things that the military can and should do in addressing the climate challenge is in support of that military mission. For example, when I observe that extreme weather events are causing damage to military bases, we need to be at the forefront of learning how to reset our base infrastructure to be resilient to those climate effects.

And, that is part of the military's mission. That will have other benefits to the local communities in which the bases are located—from Norfolk to Florida.

At the same time, the military is a large user of energy in the United States. And, what we have learned over the last several decades is that we can increase the performance and effectiveness of our propulsion systems, of much of our weapons systems, and at the same time we can be more efficient in our use of energy and we can take advantage of changes and technological progress in the advanced energy system.

So, we have seen that, for example, when in Iraq and Afghanistan we were losing people, putting soldiers at risk when they were convoying fuel to the front, we learned how more efficiently to provide that fuel and water to our forces at the front. We also learned to provide different ways of powering our bases, or to use energy-efficient insulating foam and other techniques.

Those all support the military mission. That technological development, began through a variety of different research and development programs, both in the Department of Defense and in conjunction with the Department of Energy and others, provides valuable benefits for the military mission. And, at some time, just as it has done through other non-military technologies, has aided in the furtherdevelopment and commercialization of those technologies.

Ms. WILD. So, I would like to see us be more proactive and a little less reactive to all kinds of problems in our country and in our world and, in the context of this hearing particularly, climate change. Do you believe, Ms. Goodman, that this Administration—actually, let me ask this of Admiral McGinn, if I may.

Admiral, do you believe this Administration is taking climate change and the threats that it presents to U.S. national security and global conflicts as seriously as it should be?

Mr. MCGINN. I think the rhetoric would appear that it is not. Although there are many, many people in the Administration, I am absolutely certain, understand the business case for doing something about this, this enormous problem. There are costs, there are benefits, and there are risks to any endeavor in the military sphere, in the national security sphere. And these pragmatic people, these patriots, get that. And they are taking appropriate actions.

But those actions could be so much better supported and accelerated and magnified, and the effects so much better, the benefits so much sooner and broader, I think that that could be a major change.

And I will just say I am so pleased as a citizen to hear both sides of the aisle talking about climate change as real. It is a problem. Lots of discussions about how best to deal with it and all of that, but recognizing the problem is 50 percent of its solution.

Ms. WILD. Thank you. I am almost out of time here. But how might it be better supported? You mentioned that it could be better supported in this endeavor.

Mr. MCGINN. I think encouraging the deployment of better forms of energy, microgrids, storage systems, working with the private sector in public/private ventures, working with communities as the Navy has up in New London, Connecticut, out in Hawaii and in California. And I just think that that could really, really accelerate the deployment of clean energy to the economic benefit of our private sector and our overall economy.

Ms. WILD. Thank you.

Mr. VARGAS [presiding]. Thank you. The gentlelady's time has expired. We are going to go to the next member. Going to go to the gentleman from Ohio, Mr. Chabot. You are next, sir.

Mr. CHABOT. Thank you very much, Mr. Chairman. And I spent the last almost 2 hours in the Judiciary Committee dealing with H.R. 5. Just got here. So rather than ask questions that probably some of my colleagues already asked and were answered, I would like to yield my time to the gentleman from Florida, Mr. Yoho.

Mr. VARGAS. Mr. Yoho is recognized.

Mr. YOHO. Thank you, Mr. Chabot. Mr. Chairman, thank you. And, again, thank you, guys.

You know, and I have heard over and over again some things that I really like, it is the adaptability that we have to do. You know, we can argue the causes and all that, and we can get into that and it becomes political. But it is the adaptation of our military bases.

I come from Florida and so we are well aware of the affects from that. We have had Hurricane Irma go through the whole State.

And, you know, leadership, we have seen record amounts of coal-fired power plants go out of, go out of business with this Administration, switching to either going out of business or switching to LNG. And I guess, Mr. Worthington, since you are from the energy realm, is that a good thing, switching to LNG from coal?

Mr. WORTHINGTON. Well, it is a good thing when individual companies, corporations make decisions that are in their best interests based on the market. At the current moment you have our abundant, wonderful bonanza of shale gas development has provided the United States with a very unique opportunity. We are expanding our domestic energy production while we are reducing CO2 emissions.

Mr. YOHO. OK.

Mr. WORTHINGTON. It is really quite marvelous.

Mr. YOHO. And we have run an energy summit in the last 2 years. Jacksonville, I am sure you are aware of this, is the largest storage bunker in capacity in the United States of LNG. And we have had 20 different nations that have come there. They want LNG out of the U.S.

And, you know, from a geopolitical standpoint they want something that is inexpensive, reliable, with a reliable partner. And so our goal is to do this.

And yet, we talk about China and the, you know, the different accords that countries sign up to. And we heard that the EU is not adhering to it. China is trying. Yet they are building these dirty coal-powered fireplaces or power plants instead of using the new technology. And I think it just shows it is disingenuous of China. And I think it shows the leadership of America by putting in the regulations to allow us to export more LNG, having countries convert to LNG.

Turkey was there, and they get about 98 percent of their energy from outside sources. And Mongolia gets 90 percent of their energy from Russia. And Russia uses that as a geopolitical tool

So, as far as climate change, I will ask the panel what can we do to get countries to stop building the dirty coal plants, you know,

like China is doing without the advanced technology? Admiral, how do you put pressure on a country like China?

Mr. MCGINN. I think competing economically and providing the kinds of solution you mentioned, LNG as a good interim substitute for coal. You get electrons out but you do not get—you get half of the greenhouse gas emissions that you would for a coal plant, to say nothing of the other, other emissions.

I think that if we continue to invest in our technology, not just advanced technology but actually deploying things that work, better storage technology, better production of wind and solar electricity, better electrification of our transportation system, we can in fact motivate nations like Russia, or especially China to, to invest in those things as well even more, and to deploy them.

And I would like to see "Made in the USA" on more and more green things across the world.

Mr. YOHO. Oh, I sure would, too.

And you know, and I look at energy. It is all of the above. We want the ones that make the most sense that, you know, benefit everybody and that is profitable. This committee and the President signed into law last year the BUILD Act, which is something to counter China's BRI initiative. And this is something as we go to the developing countries that we can use that technol—or that, that vehicle and invest in the proper technology that will propel them into the 21st Century in a smart way.

I am going to yield back to Mr. Chabot, if you have any other comments. And thank you.

Mr. CHABOT. Thank you very much. And I will yield back, Mr. Chairman.

Mr. VARGAS. Thank you very much. The gentleman yields back.

Go to the next member, the member from California, Ted Lieu, Mr. Ted Lieu.

Mr. LIEU. Thank you, Mr. Chair.

I previously served on active duty. And I know that we have the best military in the world because we rely on data, on facts, and on science. We do not live in a fantasy world because if we did, U.S. troops will die. We live in reality and we understand, the military does, that climate change is real and it is harming national security.

That is why I am so pleased that Republican Ranking Member McCaul today in his opening statement acknowledged that climate change is real and that it is threatening U.S. national security. We cannot solve a problem if people do not agree that there is a problem in the first place. So I am pleased that more and more Republicans no longer believe climate change is a hoax perpetrated by the Chinese.

Now, Admiral, again, you have stated that in your own testimony, earlier to a question that climate change ranks right near the top in terms of threats to U.S. national security. I believe you are right. There was an article in The Guardian titled "Pentagon Report Finds that Climate Change Threatens Half of U.S. Bases Worldwide."

One of these bases is Joint Operating base in the small island of Diego Garcia. Can you explain to us how important that base is to U.S. national security and our ability to project power?

Mr. MCGINN. It is located in a very strategic area of the world in which—from which you can use it as a platform to send power down range to the Middle East, to the South Asian subcontinent. And to lose that, that base's effectiveness at Diego Garcia because of sea level rise or other reasons would cause us to slow down the ability to flow in combat power logistics and all the things you need to respond to a regional crisis, or even a humanitarian assistance.

Mr. LIEU. Thank you. And, in fact, in the first Iraq war air strikes were launched from that base; correct?

Mr. MCGINN. That is right.

Mr. LIEU. So, Mr. Chair, I would like to enter that article in for the record.

I will catch him later.

Mr. Chair, I would like to enter the article in for the record.

Mr. VARGAS. Without objection.

[The information referred to follows:]

The Guardian



This article is more than **1 year old**

Climate change threatens half of US bases worldwide, Pentagon report finds

Defense department says wild weather could endanger 1,700 sites
Findings run counter to White House views on climate

Reuters in New York

Wed 31 Jan 2018 14.12 EST

Nearly half of US military sites are threatened by wild weather linked to climate change, according to a new Pentagon study whose findings run contrary to White House views on global warming.

Drought, wind and flooding that occurs due to reasons other than storms topped the list of natural disasters that endanger 1,700 military sites worldwide, from large bases to outposts, said the US Department of Defense (DoD).

"Changes in climate can potentially shape the environment in which we operate and the missions we are required to do," said the DoD in a report accompanying the survey.

"If extreme weather makes our critical facilities unusable or necessitates costly or manpower-intensive workarounds, that is an unacceptable impact."

The findings put the military at odds with Donald Trump, who has repeatedly cast doubt on mainstream scientific findings about climate change, including this week during an interview on British television.

Trump has also pulled the United States out of the global 2015 Paris accord to fight climate change.

The Pentagon survey investigated the effects of "a changing climate" on all US military installations worldwide, which it said numbered more than 3,500.

Assets most often damaged include airfields, energy infrastructure and water systems, according to military personnel at each site, who responded to the DoD questionnaire.

John Conger, a senior policy analyst at the Center for Climate and Security in Washington, said the report's commissioning by Congress showed a growing interest by lawmakers into the risks that climate change poses to national security.

The study was published late last week and brought to public attention this week by the Center for Climate and Security.

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Please help us reach our goal by contributing today.

Mr. LIEU. All right. I have a second article now, "How Climate Change is Threatening the Navy's Footprint in the Pacific." And it talks about the island of Guam where I served on active duty. And the article says, "This tiny Western Pacific island is central to U.S. security interests in the region. It is home to two of the Nation's most strategically important military bases, both threatened by climate change."

Can you explain to the committee how important the two bases on Guam are to our national security?

Mr. MCGINN. Once again it is because of location to areas of potential conflict or actual unrest now that Guam and those far, far Western Pacific platforms, in this case a U.S. territory, are. We have got capabilities there for missile defense forward. We have got capabilities to launch and to maintain submarine presence, surface warfare. And, of course, with the Andersen Air Force Base, any kind of Navy, Air Force, or Marine Corps air power.

Mr. LIEU. Thank you. And, Mr. Chair, I would like to enter that article in the record as well.

Mr. VARGAS. Without objection.

[The information referred to follows:]

How climate change is threatening the Navy's footprint in the Pacific

Kate Cimini, Medill News Service Published 6:00 a.m. ET June 28, 2018



(Photo: Gerald Harris/Medill News Service)

TAMUNING, Guam — The day before May's full moon, Vic Sahagon, a former Army infantryman, was hanging out on one of Guam's postcard-perfect beaches under a raised blue tent, sucking down Budweisers and mustard-covered hot dogs alongside his fishing buddies.

They had been waiting hours in the intense heat to net schools of juvenile rabbitfish with the talayeru, a circular net ringed with weights unique to Guam's Chamorro culture. The schools of the minnow-sized fish once were often the length and breadth of a bus but now, he lamented, its lunar calendar-tied mating and feeding cycles had shifted and the schools were barely as big as a picnic table.

On Guam, signs of climate change are everywhere: In fishing cycles, rising sea levels, declining reservoirs of drinking water and telltale pieces of dead staghorn coral washing ashore, signaling the slow death of the island's protective coral barrier that prevents erosion.

This tiny Western Pacific island is 7,920 miles from Washington but central to U.S. security interests in the region. It is home to two of the nation's most strategically important military bases — both threatened by climate change.

Climate change has already begun to re-shape the island.

The Environmental Protection Agency warned in an August 2016 report that Guam's air and ocean are warming, the sea level is rising and the ocean is becoming more acidic. Combined, these changes stress and kill the ring of coral that protects against storms and coastal erosion.

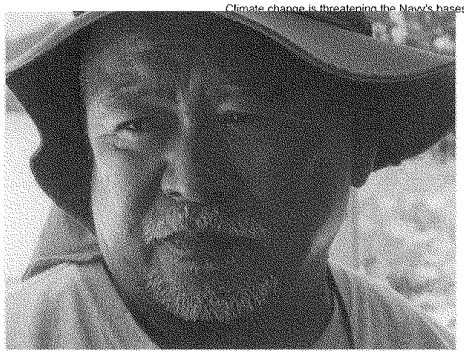
Furthermore, Guam is beginning to see a reduction in freshwater during the dry season, increased damage from flooding and typhoons, and an increased average air temperature, which means days when the heat index is dangerously high will become more common and impede military operations.

"If the military is thinking about the security of their bases, they have to think about the security of the land they're inhabiting, the security of the water they use," said Robert A. Underwood, former president of the University of Guam and the one-time Guam delegate to the U.S. House of Representatives.

Naval Base Guam boasts two submarine support vessels and four nuclear fast-attack submarines, which have been used to gather intelligence along the Korean Peninsula and in the South China Sea, where China has been building man-made islands to extend its reach.

Andersen Air Force Base, spread across Guam's northernmost tip, has served as a launching pad for B-52 bomber runs over parts of Asia. Additionally, at least one anti-missile defense system is permanently based at Andersen.

The U.S.-held territory, with a population of about 167,000 — including about 7,000 naval and Air Force personnel in addition to their families—is where America projects her power westward towards Asia and the South China sea.

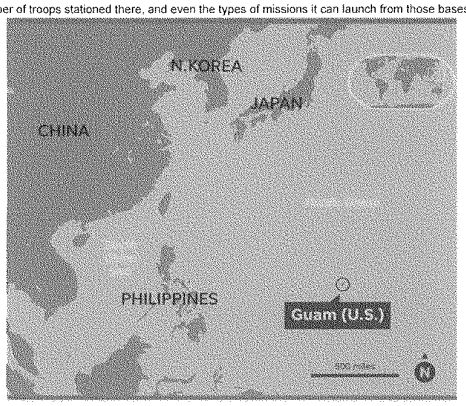


Vic Sahagon's mother threw the talayeru to feed her family when he was a child, but it wasn't until he was an adult that he decided to learn the ancient Chamorro fishing technique. *(Photo: Gerald Harris/Medill News Service)*

The Trump administration has scrubbed mentions of climate change from governmental sites and documents, declining to formally recognize it as a national security threat. However, a 2012 report by the non-partisan American Security Project found Guam to be one of the five naval bases most threatened by climate change.

Global warming — the effect of man-made and natural emissions of heat-trapping gases — threatens not only a way of life on Guam, but freedom for the United States to act unimpeded by restrictions that might be imposed by host countries in the Pacific.

Although South Korea and Japan play host to U.S. naval bases, those countries' own political interests leave the United States facing restrictions on the number of troops stationed there, and even the types of missions it can launch from those bases.



Indeed, over the past several years, the U.S. military has sought to relocate 5,000 Marines and their families from Okinawa to Guam to realign forces in the Pacific region and reduce political tension in Japan. That would nearly double the number of forces stationed on Guam and significantly increase naval water usage.

As Navy leaders grapple with the effects of climate change here, they must do so throughout the world as well. The Navy faces disastrous effects on its infrastructure and installations, as well as on human populations displaced by severe heat, rising seas and water shortages.



More than 500 species of coral make up Guam's reef, which is one of the most diverse in the world. *(Photo: Kate Cimini/Medill News Service)*

Climate change a worldwide threat

A 2010 report by the Department of Defense showed that more than 30 bases were at risk from rising seas; a 2016 survey by the Union of Concerned Scientists raised that number to 128 in the United States alone. Additional bases face threats from severe storms, warming oceans and the contamination of drinking water.

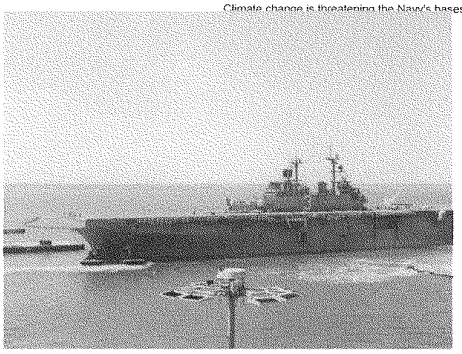
Guam is hugely important from a logistics standpoint in facilitating the flow of supplies to forces in the Pacific, said Retired Adm. Gary Roughead, a former chief of naval operations who created a Navy task force on the impact of climate change on military operations in the Arctic. However, he said, other Navy sites face even more dire and immediate concerns, such as Naval Station Norfolk in Virginia.

Norfolk, the largest naval installation in the world, is sinking into the ocean after decades of unsustainable groundwater use. Home to 75 ships and 134 aircraft, as well as over 80,000 active duty sailors, Norfolk routinely suffers crippling floods of roads and parking structures.

A 2014 Department of Defense study found one and a half feet of sea level rise to be a "tipping point" for Norfolk, at that point it will suffer significant infrastructure damage and losses in mission performance. Experts predict sea levels will rise a minimum of three feet-three inches within the next 100 years.

"All I know is that the climate and the planet are changing markedly, and we need to do things to get ready for that," Roughead said, skirting the political contention over the causes of global warming.

"Unfortunately, there's still debates about climate science and policy," said Shana Udvardy, climate preparedness specialist at the Union of Concerned Scientists. "Last December, President Trump put out a national security strategy that wiped clean any mention of climate change. While this may be the case, the Navy understands climate change and they're working to address it."



The USS Kearsarge, an amphibious assault ship, pulling away from Naval Station Norfolk docks in Virginia. Significant portions of the base are less than 10 feet above sea level. *(Photo: Kate Cimini/Medill News Service)*

Climate change affects every aspect of naval operations, from where sailors are based to how they are trained to when and where they are deployed.

Indeed, the Navy has shown significant interest in climate change vulnerabilities over the past several decades. It has built multi-story piers, worked with local communities, revamped training syllabi and cut back on construction in flood plains. It even deployed the Great Green Fleet in 2016, a group of ships that runs on a mixture of regular fuel and biofuels, in order to cut down on carbon emissions that contribute to climate change.

But some scientists say the U.S. military is still too slow to respond to a rapidly changing climate.

"Military planning hasn't adjusted to some of the new studies at this point," said Marcus King, an associate professor at the Elliott School of International Affairs at George Washington University. King formerly served as a research analyst at the Center for Naval Analyses and as a Pentagon foreign affairs specialist. "They're not really putting the worst-case scenarios into the planning process."

An existential threat

Climate change also has amplified threats to U.S. national security, by increasing societal instability and fomenting terrorism in drought-sensitive regions while driving up the number of requests for humanitarian aid and disaster relief, analysts said.

Drought is a long-term threat to Guam, with climate change refugees from surrounding islands spurring that along.

Water contamination led to the closing of several wells in 2017, a small glimpse of a future with an overdrawn aquifer – a lens of freshwater perched atop the seawater beneath the northern half of the island. The Navy and the local government run the risk of triggering island-wide shortages of drinkable water by overdrawing the aquifer.

Navy and local officials have long managed their own water sources and rarely communicate about the areas or depths at which they draw water. But overdrawing water can introduce salt water into the freshwater, said Victoria Keener, a research fellow at the East-West Center in Hawaii who studied Guam's aquifer with the U.S. Geological Society for a Department of Defense study.

The island is also beginning to see less rainfall, so the aquifer is being replenished at a slower rate than before, said Keener. She predicts this problem will grow worse over the coming century.

If mismanagement practices are not quickly corrected, Keener explained, those, in concert with slower replenishment would eventually spell disaster for Guam's freshwater sources.

"The Department of the Navy is committed to transparent communication and partnership with communities, water authorities, elected officials, and state and federal agencies on water quality on and near our installations," public affairs officer Lt. Ben Anderson responded, on behalf of the Navy.

The Kwajalein Atoll, located in the Marshall Islands more than 1,500 miles from Guam and ten feet above sea level, provides a warning of the effect of climate change on military installations. In 2016, long after the Air Force began building a $1 billion radar installation, experts assessed the small coral atoll would be uninhabitable by humans within 25 years from saltwater intrusion in its aquifer and sea level rise.

Guam may face similar problems in decades to come, given the thinning of its aquifer. Drought could eventually force the Navy to either relocate or find alternate ways to hydrate its sailors and civilian contractors.

Although the Navy did not allow reporters for Medill News Service and USA Today onto its base in Guam, those familiar with the outpost describe it as well-protected from the elements. It is seated atop cliffs with low-slung, concrete buildings constructed to withstand typhoons. However, an overdrawn aquifer could spell the demise of the island.

At the same time drought begins to threaten Guam, the dying coral reefs that ring other low-lying islands in the Pacific are giving up the ghost. Soon they will no longer hold back tsunamis, or even strong waves that would eat away at an island's footprint. Many of those fleeing such climate change will head for Guam, known as the metropolis of the Pacific. The addition of refugees atop growing numbers of tourists and military personnel will further stretch the island's finite resources.

"Those people have no place to go," said Underwood. "The demise of the coral reef and sea level rise means they're facing an existential threat."

"We have a number of those people living within a couple hundred miles of here," Underwood added. "The potential demographic impact of that on Guam is large."

Without a consistent supply of freshwater, it will be difficult to sustain a base on Guam, leaving the Navy without local residents to work on the base, a community to employ their spouses or even educate their children.

That, in turn, can upset the Navy's ability to carry out its mission.

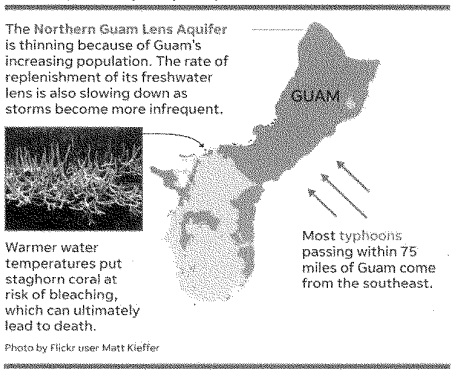


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Mr. LIEU. And then my final article today, "The Military Paid for a Study on Sea Level Rise. The Results Were Scary." That is a Washington Post article dated April 25th, 2018. It talks about this small island of Roi-Namur which houses the massive Ronald Reagan Ballistic Missile Defense Test Site. It is now in routine threat of flooding because of climate change.

[The information referred to follows:]

The Washington Post

Climate and Environment

The military paid for a study on sea level rise. The results were scary.

+ Add to list

By Chris Mooney and
Brady Dennis
April 25, 2018

This story has been updated.

More than a thousand low-lying tropical islands risk becoming "uninhabitable" by the middle of the century — or possibly sooner — because of rising sea levels, upending the populations of some island nations and endangering key U.S. military assets, according to new research published Wednesday.

The threats to the islands are twofold. In the long term, the rising seas threaten to inundate the islands entirely. More immediately, as seas rise, the islands will more frequently deal with large waves that crash farther onto the shore, contaminating their drinkable water supplies with ocean saltwater, according to the research.

The islands face climate-change-driven threats to their water supplies "in the very near future," according to the study, published in the journal Science Advances.

The study focused on a part of the Marshall Islands in the equatorial Pacific Ocean. Hilda Heine, president of the Marshall Islands, said in an interview that Wednesday's journal article "brings home the seriousness" of the predicament facing her island nation.

"It's a scary scenario for us," she said.

The research also has ramifications for the U.S. military, whose massive Ronald Reagan Ballistic Missile Defense Test Site sits, in part, on the atoll island of Roi-Namur — a part of the Marshall Islands and the focus of the research.

The U.S. military supported the research in part to learn about the vulnerability of its tropical-island installations. The Pentagon base on Roi-Namur and surrounding islands supports about 1,250 American civilians, contractors and military personnel.

"This study provided a better understanding of how atoll islands may be affected by a changing climate," Defense Department spokeswoman Heather Babb said in a statement. "While no decisions have been made about Department of Defense activities on the islands based on the study, DOD continues to focus on ensuring its installations and infrastructure are resilient to a wide range of threats. The department's understanding of

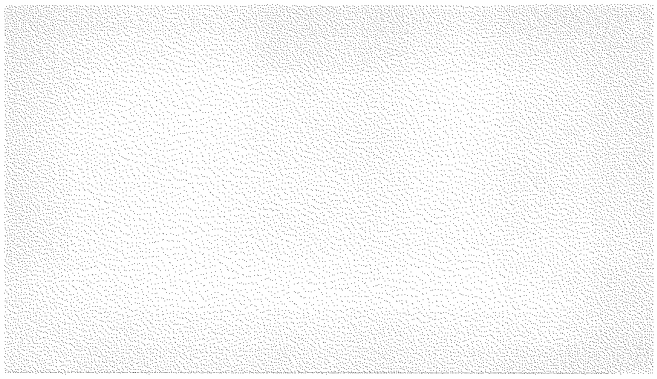
rising sea levels will enable the military services and agencies in affected areas to make informed decisions on how to continue to execute their missions."

The low-lying island, which rises barely six feet above the current sea level, is part of the vast Kwajalein coral atoll, a structure that formed as coral reefs grew around a sinking volcanic island long ago. That is the origin of more than a thousand other low-lying, ring-shaped atoll islands or atoll island chains across the Pacific and Indian oceans. Most are not populated, but some, such as the Marshall Islands and Maldives, are home to tens or even hundreds of thousands.

While seas are rising by 3.2 millimeters per year at the moment and expected to rise even faster in years ahead, Roi-Namur has a good chance of avoiding total inundation this century.

But the new research — conducted by researchers from the U.S. Geological Survey, the National Oceanic and Atmospheric Administration and several other institutions in the United States, Monaco and the Netherlands — suggests that saltwater contamination of the island's aquifers would probably occur at 40 centimeters (about 15 inches) of sea-level rise. A rise of five to six centimeters globally has already occurred since 2000, and the sea-level rise is even faster at the Kwajalein atoll.

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The danger comes because of the increasing ability of large waves to spill across the island and sink into its groundwater.

"Historically, there would be an overwash event due to a cyclone or typhoon every 20 or 30 years," said Curt Storlazzi, a USGS researcher who led the study. "Every 20 or 30 years or more, communities can recover in that time. The concern is that with sea-level rise, those flooding events are going to happen more frequently."

Wave overwash events already occur — a 20-foot-high wave swept across Roi-Namur in 2014 — but the computer model used by the study finds that they become more likely as seas rise, and once they occur two years in a row, the groundwater could become undrinkable.

The "tipping point" in the study varies depending upon the rate of climate change — and above all the stability of Antarctica. In the worst case, the paper says, it could come "before 2030." However, a prominent expert in sea-level rise who was not involved in the study, Bob Kopp of Rutgers University, questioned that especially dire finding.

"They're asking the right questions, they're doing the right sorts of analysis, but I'm a little skeptical of some of their early-century dates for some things," Kopp said in an interview with The Washington Post.

For less dire scenarios, the critical moment is pushed further off to the decade between 2030 and 2040 for a high warming scenario without Antarctic collapse, or 2055 to 2065 for a middle-range warming scenario. Kopp said that middle scenario is consistent with what is known and provided an analysis suggesting that while there is indeed a major threat, it won't arrive as soon as 2030 but could by the 2050s.

"Even if you take their most conservative scenario, the numbers are really disturbing," Kopp said. "And there's nothing wrong with their conservative scenario."

Storlazzi said that, if anything, Roi-Namur is probably somewhat higher in elevation than many other coral atoll islands. Hence the conclusion that so many of them could be at risk — the study says that "most" are — and that the occupied ones might also, in the relatively near future, have to worry about their drinking-water supplies.

The research was commissioned by the Pentagon's Strategic Environmental Research and Development Program and published in a more lengthy form earlier this year, in a report that partly focused on helping the military identify sites where its assets could be vulnerable.

There, the researchers called the inquiry on Roi-Namur a precursor to a comprehensive examination of numerous atoll islands managed by the Defense Department "that are most vulnerable to sea-level rise and associated impacts over the next 20 to 50 years."

"If these impacts are not addressed or adequately planned for, as it becomes necessary to abandon or relocate island nations, significant geopolitical issues could arise," they wrote.

The United States manages military installations or assets not only in the Marshall Islands but also on Wake Island, another Pacific atoll, and the Diego Garcia atoll in the Indian Ocean. There are also decommissioned installations at the Midway and Johnston atolls.

John Conger, director of the Center for Climate and Security and former acting assistant secretary of defense for energy, installations and the environment, said that the department "is increasingly cognizant of threat of sea-level rise on its installations."

Part of the risk can be addressed by adaptive measures, he said, but that's costly. He called the new study "a little bit jarring."

"They are going to have to make some operational decisions," Conger said. "This is sort of the front lines of sea-level rise and climate change. It's not that the entire island is going underwater — it's that you don't have drinking water. It's going to wreck the aquifer."

Rising seas threaten even some projects that remain under construction.

Case in point: the $1 billion "Space Fence," a radar installation on Kwajalein Atoll that is intended to track tens of thousands of pieces of space junk — some of them as small as a baseball — in an effort to keep orbiting satellites and astronauts safe. The state-of-the-art project is being constructed for the Air Force by Lockheed Martin and is supposed to be fully operational later this year.

But its location on the tiny atoll already has raised concerns that **the site could face routine flooding threats within a matter of decades and that saltwater could damage its expensive equipment.**

The study underscores why many small island nations clamored to ensure that the 2015 Paris climate agreement included language requiring the world to strive to limit global warming to 1.5 degrees Celsius (2.7 degrees Fahrenheit) above preindustrial levels, an extremely stringent target. Atoll-dependent nations that have been heavily involved in the push for climate action include the Marshall Islands, Maldives, Kiribati and Tuvalu.

But with the planet already 1 degree Celsius (1.8 degrees Fahrenheit) warmer, holding warming to 1.5 Celsius seems unlikely, because it would require extremely rapid shifts away from the current energy system toward renewables, rather than the more gradual change now underway.

The new study did not address specific Paris climate targets, but Kopp's additional analysis found that even under a 2-degree or 1.5-degree Celsius climate scenario, by late in the century, more than 40 centimeters of sea-level rise will probably occur. Still, these scenarios would buy atoll islands some time.

"The research is a reminder of the immediate threat of sea-level rise," said Simon Donner, a professor at the University of British Columbia who studies coral reefs and climate change and wrote a comment by email from Kiribati.

"It is also a reminder that the people in atoll countries, who are not responsible for climate change, are not receiving the necessary international support," he continued. "Despite the dire findings of this study, adaptation is not absolutely impossible: the construction by China on atoll islands in the South China Sea is evidence of that. Adaptation is, however, prohibitively expensive for developing countries like Kiribati (where I am currently)."

Heine, the Marshall Islands president, said there is no ignoring the effects climate change already is having. Just last week, she said, waves washed over parts of the island nations, thanks to a combination of wind and

ocean currents exacerbated by sea-level rise. Residents were left to clean up flooded roads and neighborhoods.

"It's more of a nuisance than anything, but things like that are coming every other month or so," she said. "It makes people feel insecure in their own homes."

Her government is doing what it can to protect its vulnerable shorelines, building new sea walls with the limited resources it has. But it's not nearly enough. And she has watched with exasperation as the United States has backed away from the Paris climate accord under President Trump, whose administration has scarcely acknowledged the looming threats posed by climate change.

"The leaders of the United States need to get on board. ... We should stop denying what is happening and help vulnerable countries like ours," Heine said. "It's important for people in the U.S. to realize that this is real, it's happening to people. We are not the ones creating this, but we are the ones who have to live with it."

A critical issue for the islands in question is the fate of the coral reefs from which they are made and that surround them. Reefs break waves, helping to prevent overwash events, and they also grow to keep pace with sea-level rise — at least to an extent.

But even as seas are rising, coral reefs around the world have been suffering from severe bleaching events and are weakened further by acidifying oceans. This suggests that reefs could be hobbled and unable to protect their islands from waves.

"The coral reefs these days have suffered not only of sea-level rise but mostly in terms of acidification of the ocean and also increase of temperature," said André Droxler, a geoscientist at Rice University who has studied how corals succumbed to fast-rising seas at the end of the last ice age. "So climate change will increase the rate of sea-level rise, but also it will decrease the possibility for these corals to keep up."

The current study suggests that if reefs falter — as they are doing around the world — then the major wave risk to coral atoll islands could come still earlier.

Droxler said the study reminded him of Maldives, where he has worked and which faces a situation similar to that of the Marshall Islands. "The maximum elevation is 2.4 meters, and there are more than 140,000 people living in two square miles," he said of the capital island of Male.

"It is kind of the ultimate example of the destiny of these tropical islands, which are so low in elevation," Droxler said.

And each passing year, as seas continue to rise and the nations and the world wrestle with how to cut carbon dioxide emissions, thousands of islands grow closer to a reckoning.

"The longer we talk about this," Conger said, "the more the distant future becomes the near future."

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Mr. LIEU. Can Admiral McGinn or Ms. Goodman, can you explain how important it is to have the Ronald Reagan Ballistic Missile Test Site not flood?

Ms. GOODMAN. Yes. That is very important, Congressman. That is a space radar tracking station that was constructed for that island of Kwajalein at a cost of approximately one billion dollars and could be at risk of being overrun or having coastal erosion degrade that capability within the next decade or so.

Mr. LIEU. Thank you.

In my home State of California we went from the eighth largest economy in the world to the fifth largest economy in the world even though we had the strongest climate change laws in the Nation. And it is clear when you look at the data that when California did what it did all these people who want to work on clean energy, clean technology, solar, wind, all decided to come to California.

So, I have introduced legislation, The Climate Solutions Act, that basically takes California's laws and makes it national because we want the best and brightest in the world when they want to work on green technology and move our country forward to not go to China or Germany, we want them to come to the United States.

And with that, I yield back.

Mr. VARGAS. The gentleman yields back. The next member to speak is the gentlewoman from Pennsylvania, Member Houlahan is recognized for 5 minutes.

Ms. HOULAHAN. Thank you. I really appreciate all of the time of the panel. I, similar to Rep. Lieu, I served in the military as well and I did my field training at Tyndall Air Force Base. So it is kind of a catastrophe to think about that base in its current State versus the way that it was when I served.

And like many of my colleagues, I will probably follow Representative Lieu and Representative Spanberger's lines of questioning, I am really concerned that we have left the Paris Accord for lots of different reasons. But one of them, Admiral, that has to do with one of your statements is that we have to lead by example. And we are no longer doing that and we are abdicating our leadership role.

And so one of my questions to you, Admiral, first, is that you mentioned in your testimony, both live and in written form, the Administration officials that have stated the need for the government to address climate change. And my question to you is how can Congress, how can we help support the findings of the military and the intelligence communities in their efforts to mitigate climate change even though the White House currently seems unrecogniz—unwilling to recognize this growing threat? So, what can Congress do to be helpful?

Mr. MCGINN. I think continuing the discussion, as a first step, a necessary step in a bipartisan way that this is a real problem. It is growing. Delay of implementing solutions to both increase our resilience as well as to mitigate the greenhouse gases that we are putting out there, it only gets more and more expensive and more risky as each year goes by.

And I think that encouraging every department and agency in the Administration to do things that make sense from a business perspective, that the business case for creating win/wins, a win for the economy, a win for the private sector, a win for the mission of

whatever that department or agency is, especially the Department of Defense, just makes so much sense.

And I think there are so many incentives. There are, obviously, investments. It takes money to an extent but it also takes guidance as well for us to assume and maintain that mantel of leadership.

Ms. HOULAHAN. And I agree. I spent a lot of my time before doing or coming to Congress in corporate social responsibility. I think it is only in the best interests of many businesses to do the right thing for the planet.

And, actually, I would like to present the same question to Mr. Worthington that I just presented to the admiral, which is, in your testimony you said we can do this without additional regulation, we do not need the Clean Power Plan, we do not need the Paris Accord to achieve continued progress. We would rather pay engineers and lawyers. And so my question to you is, is there nothing that Congress can be doing to be helpful to advance things like climate change, which you also agree is real?

Mr. WORTHINGTON. I think that the most important thing that we need as a country that only Congress can do is to put additional resources into research and development. We have made great strides in deploying renewables. We have made great strides in improving the efficiencies of fossil units. We have a need to resurrect the domestic nuclear industry with small modular reactors. There is a whole variety of technologies that are just sitting on the cusp.

We have a great opportunity to increase our uptake of renewables if we can get less expensive electricity storage in place. We have a great opportunity eventually to convert some of our energy consumption to hydrogen-based fuels. We have a great opportunity to reduce emissions further by deploying carbon capturing storage on fossil energy units, both coal and natural gas. All of this is critical but we need additional technology development, R&D. And that is where Congress can be very helpful.

Ms. HOULAHAN. And we 100 percent agree on that. That is something that we definitely need to move forward on and support.

And with the last few seconds of my time I would like to ask Ms. Goodman, Representative Lieu talked about some places that he had served, in Guam and some places specific to his service. My question has to do with something in Pennsylvania. We have a DLA depot in Susquehanna, Pennsylvania that has identified that they are, in fact, being affected by climate change. They maintain $13 billion in materiel.

What kinds of things, what kinds of things will happen if that particular area is affected, as it anticipates being, by climate change in terms of the downstream effects of the supply chain? If you can comment on that.

Ms. GOODMAN. Well, it will degrade the DLA's ability to perform its mission at that location if it is increasingly subject to either extreme weather events, or seal level rise, or coastal erosion in that Susquehanna area. That is an important location for DLA, I know that.

And, you know that they need to make those facilities resilient, so they can continue to operate—that is, a combination of working both in the built and the natural infrastructure, and then working on solutions in conjunction with the surrounding community. And,

using available technology like predictive analytics and other solutions that will enable us to better understand and anticipate those threats, basically prepare in advance to address those challenges.

Ms. HOULAHAN. Thank you so much to everyone for your time. And I yield back.

Chairman ENGEL [presiding]. Thank you very much.

Mr. WATKINS.

Mr. WATKINS. Thank you, Mr. Chairman. And thanks to the witnesses for being here.

My question is for Ms. Goodman. In your testimony you noted that China published its first Public Arctic Policy in 2018 wherein it declared itself a near Arctic State, and articulated its intention to build a polar silk road. Could you elaborate on this?

Ms. GOODMAN. Yes, Congressman.

In 2018, China did release its first Arctic policy. It has been expanding its capabilities to operate throughout the Arctic; declaring itself a new Arctic stakeholder; looking to shorten its shipping times from China into Europe by transiting across the Northern Sea route; increasing its ice-capable vessels and ability to operate in the Arctic; increasing its extent of research and development across the region; and, also increasing its foreign direct investment with other Arctic nations, in particular, Greenland and Iceland.

Mr. WATKINS. Thank you. And this question is for anybody who would like to address it.

There are many countries around the world, of course, that are extremely underdeveloped. I spent a large part of my adult life working in a few of these countries. Does limiting the use of certain energy resources around the world make it harder for these underdeveloped countries to grow their economies and to play a role in their regions around the world?

Mr. MCGINN. I would say any country that is developing and wants to increase their quality of life and economic viability needs the best form of energy that suits their location and their needs.

Probably the most dramatic example I can think happens in sub-Saharan Africa where there have been companies and there have been private organizations that have brought solar power that has enabled cellular communication, satellite communication, access to the internet, and has empowered those communities to do things like extract water from solar-powered wells that have been able to transform their local economy at a very, very low cost, without having to build a central power plant and a transmission distribution network as we did.

This is similar in many ways to what happened after the cold war when Eastern Europe did not have to create telephone poles and wires to have a modern telecommunications. They were able to go wireless because the technology was available, and it was affordable, and it was able to be deployed very rapidly.

I think that same way of going about things is true for these developing countries.

Mr. WATKINS. Leapfrogging technology, yes.

Mr. MCGINN. Leapfrog. Leapfrog, exactly. Trying to maximize the benefits and minimize the costs, the economic costs and the environmental costs to deploying energy to developing countries.

Mr. WATKINS. Great. Thank you, Admiral.

That is it, Mr. Chairman. I yield my time. Thank you.

Chairman ENGEL. Thank you very much.

Mr. CONNOLLY.

Mr. CONNOLLY. Thank you, Mr. Chairman.

My friend Mr. Espaillat has been waiting, and I am willing to yield to Mr. Espaillat and then take my turn after that.

Mr. ESPAILLAT. Thank you, Mr. Connolly. This is the greatest form of collegiality I have ever seen while I have been in Congress. It must be that wonderful colored tie he is wearing today.

Mr. Chairman, climate change is an existential threat. And just want to start this by laying out this fact. And if we do not act it will have massive harm on our children, our future, and our children's children. And we are already seeing the effects today: increased heat, frequency and intensity of natural disasters, the lack of water. The effects of climate change can be seen around the world. And often it affects the already marginalized among us. It makes worse political conference and endangers all of us.

Having said that, and being a member of the Western Hemisphere Subcommittee, I want to ask a couple of questions. The first one is, first of all I will start by saying that academic institutions such as Stanford, Columbia University, partner often with activists, not-for-profits, and venture capital firms to essentially reverse engineering solutions for communities suffering from devastating impact of climate change, including, as we have seen in the Caribbean and Latin America, there has been a, currently a horrible drought that is crippling the agriculture of many of those countries.

We have seen the patterns of hurricanes and tropical storms devastating the Caribbean as well.

From my understanding, in a short amount of time these initiatives have yielded substantive insights, these partnerships with academics, not-for-profits, and people on the ground. So I want to ask Mr. Weisenfeld, can you discuss the USAID investment in similar partnerships with academia or the private sector which seek to drive innovative solutions to build resiliencies and mitigate the effects of climate change?

Mr. WEISENFELD. Thank you very much, Congressman, for that question. I would be happy to discuss that. Because you have described the impacts of extreme weather events, increasing temperatures have dramatically negative consequences for communities. They often force communities into situations of suffering from floods or droughts. We also have seen increased diseases for plants in Central America and we have seen increases in coffee rust. USAID is doing the Feed the Future initiative—which the U.S. Government's global food security initiative, has invested in research, innovation, and new technologies through a range of universities that they call innovation labs.

And we have seen that employing new technologies, new ways to improve water management, more drought-resistant crops, more efficient methods at utilizing fertilizer can be preventative ways to build resilience in those communities, and help them avoid the kinds of dramatic consequences that we see.

Mr. ESPAILLAT. And what about the Caribbean? We saw what happened in Puerto Rico, the horrible storm that Puerto Rico is still reeling back from the impact of those storms. There is no guar-

antee that that region will not be, unfortunately, hit again by either a hurricane or what they call vaguadas. That is, you know, you have maybe 12, 14 days of rain, torrential tropical rain.

How could the Caribbean prepare, begin to prepare itself for this reality that is going to impact the lives of people there, and our own lives here, given that we have large populations of folks from those nations? Are there any best practices or ideas of what the road map should be short-term and long-term for the Caribbean to prepare itself?

Anybody can answer that. Yes, Ms. Goodman?

Ms. GOODMAN. You know, we have been working through the Center for Climate and Security, and with other U.S. Federal agencies, and private sector and nonprofit partners, to develop plans for increasing Caribbean resilience, because we are aware that the combination of extreme weather events, combined with prolonged droughts, is making the region more fragile.

And the agencies in the Caribbean, like CDEMA, the Caribbean Disaster Emergency Management Agency, and others, are very attentive to that and really want the technologies, and the innovation and ingenuity, that can be provided across the range of American universities and private sector entities.

So, I think this is a very fruitful area to continue to push and advance partnerships, as we develop the capability to move from reliable weather predictions of 7 days into the seasonal and subseasonal forecasting. It is going to be very important in the Caribbean and elsewhere.

Mr. ESPAILLAT. Well, I would continue to hear from the rest of you but, of course, Mr. Connolly will not be very happy as he has already conceded his time. So, thank you. Perhaps I can hear from the rest of you in writing. Thank you so much.

Chairman ENGEL. So, Mr. Espaillat, you are technically going to yield to Mr. Connolly or give Mr. Connolly his full 5 minutes. Mr. Connolly.

Mr. ESPAILLAT. Well, I yield to my good friend and colleague Mr. Connolly.

Mr. CONNOLLY. I thank both the chair and my friend of New York. And thank you all so much for being here.

Mr. Chairman, thank you for having this hearing. I think it is a critical hearing.

And, Admiral McGinn, I was particularly pleased to hear you say I think essentially, look, the military are pragmatists. We have not got time for theoretical debates. And the fact of the matter is we are seeing the consequences of something. Call it climate change, call it whatever you want, but we have got to prepare for it.

And I assume, Secretary Goodman, you, you would concur with that judgment?

Ms. GOODMAN. Yes, absolutely. We need to lead by example.

Mr. CONNOLLY. That is right.

Now, even in this Administration which continues officially to deny the science of climate change, in a January 2019 DoD report, of the 79—they looked at 79 installations. And in that report, two-thirds of those 79 installations were vulnerable to recurrent flooding; more than a half are vulnerable to drought; about a half are

vulnerable to wildfires. And a lot of that clearly is a change, is it not?

I would ask the two of you from a military perspective. We obviously did not build installations knowing they were at risk of flooding, drought, wildfires. Something has happened. Something has changed that makes a half to two-thirds of those installations vulnerable. Would that be a fair assessment?

Mr. MCGINN. It is. And it is primarily because the Earth is heating up, especially this great big heat sink called the ocean. You hear about El Nino or La Nina. And those effects put more energy into the atmosphere: stronger winds, upper air currents. They bring up much more water vapor. And the, the frequency and the intensity of storms that are in this air/ocean interface caused by the wick being turned up, if you will, and temperature is going to be a continuing phenomenon. And it will affect a lot of coastal areas and, as we saw just in the past two hurricane seasons in the Caribbean and the East Coast, areas that are hundreds of miles inland as well.

Mr. CONNOLLY. Admiral—I am sorry. Ms. Goodman.

Ms. GOODMAN. I would just add that what this means is that we can no longer fully rely on the historical record to predict what the future will bring.

Mr. CONNOLLY. Good point.

Ms. GOODMAN. So, historic heat records, flooding, and storm patterns have changed, and they have shifted. And, so when you want a reset to become more resilient for the future you cannot just rely on the past. We need to look at the changing conditions.

Mr. CONNOLLY. One of the big changes, particularly affecting your service, Admiral, again, is of course the melting of ice sheets. So, in the Arctic you have got floating ice, and if it melts, it melts. It does not particularly displace water volume, right, because it is already counted floating on the water.

But in the Antarctic and in Greenland, significant melting of ice sheets raises global sea levels, does it not?

Mr. MCGINN. It does in fact.

Mr. CONNOLLY. And what could go wrong with that from the Navy's point of view.

Mr. MCGINN. Well, I think rising sea levels affecting places like Norfolk Naval Station, Naval Air Station, Air Force bases in that Tidewater area are good examples. And, as Ms. Goodman pointed out earlier, even on sunny day flooding, king tides, et cetera, we are already dealing with that. So, increasing sea level rise because of ice sheets coming off of land masses is going to affect it.

More in our present danger, if you will, is the intensity and the frequency of storms that cause tidal surge. That is not directly related to sea level rise. But when you have a 6 or 8 or even 10 foot tidal surge, that is devastating in its power to wipe out infrastructure along the coast.

Mr. CONNOLLY. And, of course, we have the double phenomenon do not we in some of these coastal areas—you mentioned Norfolk—where we have rising sea level and we have subsidence of land. And the combination is really a problem.

Mr. MCGINN. So, location of critical back-up power systems, for example, are practical things that we can do. If you are going to

deploy a data center you do not want to put it in the basement of a building. You know, you want to put it up on higher ground. You want to think through what is it going to be like when the wind is blowing, when the rain is falling sideways, and flooding is coming in, what are the things that have to work. And we can make those engineering and design changes starting now that will help us when it is bad.

Mr. CONNOLLY. I thank you all.

And, Mr. Chairman, again, thank you so much for having this helpful hearing. I really appreciate it. I know the public does as well.

Chairman ENGEL. Thank you, Mr. Connolly.

Ms. OMAR.

Ms. OMAR. Thank you, Chairman.

I wanted to begin with a response to one of my colleagues earlier who is not here who had asked what was the percentage of displacement of people, what percentage it was due to disasters as opposed to conflict. And that percentage is 60 percent according to the Internal Displacement Monitoring Center.

We know that the global refugee crisis really is exacerbated, by climate change. And we do not need to look further from home. We know this is true. At least 400,000 residents of New Orleans were displaced by Hurricane Katrina. And for but some, and disproportionately many of those people were black and they were permanently displaced.

While climate change is making droughts and famines worse, it is making resources scarcer, making conflicts fiercer, and recession more brutal, our country is resettling historically low numbers of refugees. And citizens of some of the countries that have been hit hardest by climate change, including Yemen, and Iran, Somalia, are currently subject to an arbitrary and racist Muslim ban.

So, Ms. Goodman, you mentioned in your testimony that your parents were refugees. And as you know, I myself am a refugee. Could you tell us a little bit about the importance of American leadership in refugee resettlement, especially from a national security perspective? Specifically, do you agree with me that it is in our Nation's security interests to respond to the global refugee crisis, much of which is caused by climate-related factors, with more care than this President has done? And what might it look like to you?

Ms. GOODMAN. Thank you, Congresswoman. Yes, my mother, who was a Holocaust refugee, and is sitting behind me today, would not be here but for the open arms of the United States. And, she was one of the fortunate few who was able to escape Germany in the 1930's.

So, I fundamentally believe that it is important for America to be a refuge and to welcome those who are seeking shelter. That is not to say that we do not need immigration laws and border security. Of course we need that. But, we also need to welcome those in need, and particularly when we face the greatest wave of refugees since World War II today, many, as you have noted, are fleeing in part because of changes in climate and natural resource scarcities, in addition to seeking economic opportunity.

Mr. OMAR. Appreciate your response. It is one of the American values to see ourselves as a refuge. And I probably would not have survived if America did not open its arms to welcome my family.

Mr. Weisenfeld, in your testimony you spoke about the particular vulnerabilities to climate change in the global south. We are seeing this right now with the terrible situation in Mozambique, Zimbabwe, and Malawi where more than 800 people have been killed by the cyclone Idai.

There is also a cholera outbreak in Mozambique as a result of the cyclone that has affected more than 200 people.

I wanted to read you a quote from a CNN article that was dated on March 31st. And, Chairman, I would love to submit that for the record.

Chairman ENGEL. Without objection.

[The information referred to follows:]

BREAKING NEWS
Woman with Chinese passports arrested for illegally entering Mar-a-lago

change, the poor world is already being devastated by it

By Tara John, CNN
Updated 7:10 AM ET, Mon April 1, 2019

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Drone video shows Cyclone Idai's devastation in Mozambique 01:12

(CNN) — "Upside down" are the only words Manush Albert Alben has to describe life after the powerful Cyclone Idai.

Nearly two weeks since the powerful cyclone destroyed most of the city of Beira, Mozambique, it is a long way from normal. "There's no money, no groceries," Alben, a fisherman, said while sitting in his wooden pirogue on a local beach. "We are suffering but trying to hold on."

Known for its busy port and views of the Indian Ocean, the 19th-century city used to be the fourth largest in the country. Now Beira will go down in history as being "90% wiped out" by global warming, said Graça Machel, a former Mozambican freedom fighter, politician and deputy chair of The Elders, who spoke to CNN on the phone after visiting the city.

"This is one of the poorest places in the world, which is paying the price of climate change provoked mostly, not only but mostly, by the developed world," the 73-year-old added.

Hundreds of square miles are covered by water, flooding an area so vast it can be seen from space. Only when the water recedes completely, says Machel, will Mozambique be able to count the bodies.



The inland floodwaters have yet to clear.

Cyclone Idai is only the latest extreme weather event to blight the region, affecting more than half a million people and filling humanitarian camps with tens of thousands.

The 2015-16 El Niño weather cycle, believed to be the strongest in 50 years, severely affected Southern Africa's food security, according to the UN Food and Agriculture Organization (FAO). Dry weather conditions in large swathes of Zimbabwe, Malawi, Zambia, South Africa, Mozambique, Botswana, Lesotho, Swaziland, and Madagascar led to about 32 million people being unable to afford or resources to acquire food in 2016.

By 2018, drought, population growth and climate change nearly made Cape Town the first city in the world to run out of water.

"[Cyclone Idai] is a tragic showcase of what can happen in many other similarly situated towns and cities in low and middle income countries," Denis McClean, spokesperson for the United Nations Office for Disaster Risk Reduction, told CNN. "They are vulnerable and they are exposed."

The inequality of climate change

Climate change is often described as a problem that will affect future generations. But the world's most vulnerable are already facing its devastating effects.

The United Nations estimates that 4.2 billion people have been hit by weather-related disasters in the last two decades, with low-income countries suffering the biggest losses.

Many of the world's poorest live in equatorial regions, which already have high average temperatures. This means a tiny rise can be sharply felt and lead to harsher impacts, according to a 2018 study in Geophysical Research Letter.

Meanwhile, most of the world's richest nations are the largest emission producers -- by burning fossil fuels and modern farming practices that produce climate change causing emissions.

Using climate model projections, the paper found that if global average surface temperatures reached the 1.5 or 2 degree Celsius (3.6 degree Fahrenheit) limit -- set by the Paris Agreement -- countries like Indonesia or the Democratic Republic of the Congo would feel the changes brought on by global warming more keenly than higher latitude countries like the United Kingdom.



Photos: In photos: Cyclone Idai's impact

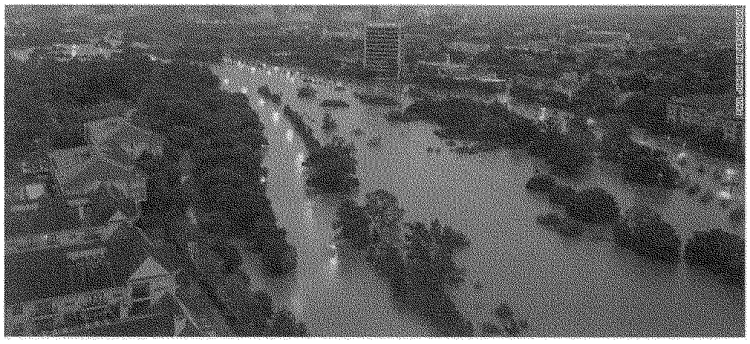
"The results are a stark example of the inequalities that come with global warming," wrote the study's lead author Andrew King, a climate researcher at the ARC Centre of Excellence for Climate Extremes and the University of Melbourne, Australia.

That is not to say that developed countries are immune to its effects.

Hurricane Harvey, a storm whose intensity was linked to climate change, caused biblical flooding in the summer of 2017 around Houston and surrounding counties. More than 120,000 people had to be evacuated or rescued, and about 80 people died.

And preliminary analysis by researchers at the Environmental Change Institute (ECI) at the School of Geography and Environment in Oxford University, found that Europe's uncharacteristically hot and dry summer of 2018 was likely linked to climate change.





Parts of Houston were flooded during Hurricane Harvey.

"Wealthy countries like the United States [are] able to prepare and cope with problems like climate change better than poorer countries," Michael Oppenheimer, Princeton Professor of GeoScience and International Affairs, told CNN's Christiane Amanpour.

In 2016, the US Department of Housing and Urban Development awarded $48.3 million to the state Louisiana to help with the climate relocation of the entire community on Isle de Jean Charles, which lost more than 97% of its land to the sea in the last 60 years.

"But in some places poorer countries have actually done a better job than the United States. Because for all our worth -- or our wealth, we've been asleep at the wheel and that's due to bad leadership in the federal government," Oppenheimer said.

Infrastructure wrecked

Countries like Mozambique and Bangladesh, whose low-lying, densely populated coastal towns and cities are on the front lines of climate change, have agonized over the issue of a warming planet.

"It is quite clear that rising sea levels and warming seas contributes to the intensification of these weather events," McClean told CNN.

Bangladesh, which saw at least 1,200 die and more than 41 million people affected by monsoon rains and flooding in 2017, is girding for a battle against climate change, Ricardo Safra de Campos, a Research Fellow at the College of Life and Environmental Sciences at the University of Exeter, told CNN.



Catastrophic flooding in Bangladesh in 2017 destroyed at least 950,000 houses.

The country has built anti-cyclone shelters, coastal embankments, and invested in a cyclone and flood warning prediction systems. However, its efforts are financially limited, adds Safra de Campos.

Beira, which lies below sea level, is no stranger to floods. Officials worried about the low lying city, which is filled with poorly planned settlements. It had flood defenses in place before Cyclone Idai hit.

According to the World Bank, funds were provided in 2012 to help the city build flood control stations, a large water retention basin, and the restoration of a storm drainage system and canals.

But the cyclone's 175 kph (110 mph) winds and and accompanying rains laid waste to Beira's defenses -- ripping the foundations of bridges, bursting riverbanks and sweeping away homes.

Stronger storms

"High rates of poverty, a lack of resilient infrastructure, slums and a disappearance of protected infrastructure in low- and middle-income countries" create a cocktail of risk, said the UN's McClean.

But cities, towns and villages may not stand a chance to withstand the scale and intensity of extreme weather events, which have "more or less doubled in the last 40 years," he said.

When Super Typhoon Haiyan, which turned into a Category 5 hurricane from the warming waters in the ocean, struck the Philippines in 2013 it became one of the strongest tropical storms in history.

Filipinos had never seen anything like it, McClean said. The people in the coastal city of Tacloban could not even describe the seven-meter tidal surge that came with the storm.



Aid groups believe the death toll in Mozambique will be far higher than the official figure.

"They simply did not have words to explain what was happening to them," he said.

While it is too early to gauge the magnitude of Cyclone Idai, the UN World Meteorological Organization projects the disaster could be among the worst weather-related disasters in the southern hemisphere.

The UN's Economic Commission for Africa estimates that Mozambique, Zimbabwe, and Malawi, may have lost $1 billion of infrastructure in the cyclone.

"They lost everything, including the references of their past and cultural heritage," Machel added. "Everything is washed away....[but] the social fabric is the one which will be extremely difficult to reconstruct," even when the roads are re-paved, she said.

As events in Mozambique, Bangladesh and the Philippines have shown, climate change is a problem of the present. Not just the future.

With reporting from CNN's Anna Cardovillis in Mozambique and Duarte Mendonca in London.

Mr. OMAR. Graca Machel, a former Mozambique Minister of Education and Culture, said to CNN, "This is one of the poorest places in the world which is paying the price of climate change provoked mostly by the developed world."

I tend to agree with her. The United States contributes disproportionately to the emission of green gases, trailed only China in recent years. So it seems to me quite obvious that our domestic consumption and domestic environmental policies are harming our national security by exacerbating the effects of climate change.

Do you think it is fair to say that as a matter of national security we must take a concerned effort to cut out own green gas emissions? And is it fair to say that this should be an imminent and urgent priority for our country?

Mr. WEISENFELD. Thank you very much for the question, Congresswoman. And thank you for highlighting the plight of the people in Mozambique and in the southern part of the world who are suffering from this.

My experience is in the international development field. I am not someone who is very familiar with the issues of global carbon emissions. I would say that, I had the privilege earlier in my career to have served in Zimbabwe and have seen some of the areas that are subject to these floods. And I can recall back in the mid-'90's driving across Mozambique and seeing that it is in fact one of the poorest countries in the world.

And it is a great tragedy of climate change that the countries that are the most fragile, where governments are the weakest, where communities are the most vulnerable are the ones who experience the greatest impact of climate change. And I firmly believe the U.S. people, as a country that is very generous, is deeply interested in investing in those areas and ensuring that we can take preventative actions using modern technologies to ensure that people have structures, and water efficiency, and understand water flow so that we can mitigate these impacts before they happen.

Mr. OMAR. Thank you. And I yield back.

Chairman ENGEL. Thank you. That concludes today's hearing. I again thank all witnesses and all our members for their participation today.

The committee stands adjourned.

[Whereupon, at 12:23 p.m., the committee was adjourned.]

APPENDIX

FULL COMMITTEE HEARING NOTICE
COMMITTEE ON FOREIGN AFFAIRS
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, DC 20515-6128

Eliot L. Engel (D-NY), Chairman

April 2, 2019

TO: MEMBERS OF THE COMMITTEE ON FOREIGN AFFAIRS

You are respectfully requested to attend an OPEN hearing of the Committee on Foreign Affairs to be held in Room 2172 of the Rayburn House Office Building (and available live on the Committee website at https://foreignaffairs.house.gov/):

DATE: Tuesday, April 2, 2019

TIME: 10:00 a.m.

SUBJECT: How Climate Change Threatens U.S. National Security

WITNESSES: Vice Admiral Dennis V. McGinn, USN (Ret)
(Former Assistant Secretary of the Navy for Energy, Installations and Environment)

The Honorable Sherri Goodman
(Former Deputy Undersecretary of Defense for Environmental Security)

Mr. Paul Weisenfeld
Executive Vice President, International Development
RTI International
(Former Assistant to the Administrator for the Bureau for Food Security, U.S. Agency for International Development)

Mr. Barry K. Worthington
Executive Director
United States Energy Association

By Direction of the Chairman

The Committee on Foreign Affairs seeks to make its facilities accessible to persons with disabilities. If you are in need of special accommodations, please call 202/225-5021 at least four business days in advance of the event, whenever practicable. Questions with regard to special accommodations in general (including availability of Committee materials in alternative formats and assistive listening devices) may be directed to the Committee.

COMMITTEE ON FOREIGN AFFAIRS
MINUTES OF FULL COMMITTEE HEARING

Day *Tuesday* Date *04/02/19* Room *2172 RHOB*

Starting Time *10:03 a.m.* Ending Time *12:23 p.m.*

Recesses *0* (____to____) (____to____) (____to____) (____to____) (____to____) (____to____)

Presiding Member(s)
Chairman Eliot L. Engel, Rep. William Keating, Rep. Jim Costa, Rep. Juan Vargas

Check all of the following that apply:

Open Session ☑
Executive (closed) Session ☐
Televised ☑

Electronically Recorded (taped) ☑
Stenographic Record ☑

TITLE OF HEARING:
How Climate Change Threatens U.S. National Security

COMMITTEE MEMBERS PRESENT:
See attached.

NON-COMMITTEE MEMBERS PRESENT:
N/A

HEARING WITNESSES: Same as meeting notice attached? Yes ☑ **No** ☐
(If "no", please list below and include title, agency, department, or organization.)

STATEMENTS FOR THE RECORD: *(List any statements submitted for the record.)*
SFR - Engel (I), Engel (II), Connolly

IFR - Lieu (I), Lieu (II), Lieu (III), Omar

QFR - Sires, Smith

TIME SCHEDULED TO RECONVENE _____
or
TIME ADJOURNED *12:23 p.m.*

Evan Burke
Full Committee Hearing Coordinator

HOUSE COMMITTEE ON FOREIGN AFFAIRS

FULL COMMITTEE HEARING

PRESENT	*MEMBER*
X	Eliot L. Engel, NY
X	Brad Sherman, CA
	Gregory W. Meeks, NY
	Albio Sires, NJ
X	Gerald E. Connolly, VA
X	Theodore E. Deutch, FL
X	Karen Bass, CA
X	William Keating, MA
	David Cicilline, RI
X	Ami Bera, CA
X	Joaquin Castro, TX
X	Dina Titus, NV
X	Adriano Espaillat, NY
X	Ted Lieu, CA
X	Susan Wild, PA
X	Dean Phillips, MN
X	Ilhan Omar, MN
X	Colin Allred, TX
X	Andy Levin, MI
X	Abigail Spanberger, VA
X	Chrissy Houlahan, PA
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X	Lee Zeldin, NY
	James Sensenbrenner, Jr., WI
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	Brian J. Mast, FL
	Francis Rooney, FL
X	Brian K. Fitzpatrick, PA
	John Curtis, UT
	Ken Buck, CO
X	Ron Wright, TX
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X	Tim Burchett, TN
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X	Steve Watkins, KS
	Michael Guest, MS

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CONSERVATION INTERNATIONAL

April 2, 2019

The Honorable Eliot Engel
Chairman, Committee on Foreign Affairs
U.S. House of Representatives
2170 Rayburn House Office Building
Washington, DC 20515

The Honorable Michael McCaul
Ranking Member, Committee on Foreign Affairs
U.S. House of Representatives
2066 Rayburn House Office Building
Washington, DC 20515

Re: Committee Hearing on "**How Climate Change Threatens U.S. National Security**"

Dear Chairman Engel and Ranking Member McCaul,

Thank you for the opportunity to provide input to the Committee's hearing: "How Climate Change Threatens U.S. National Security."

The ties between international conservation, climate change, and national security have become increasingly clear. The world is less safe when shortages of fresh water, food, and other natural resources lead to instability and conflict. Conflict can arise when criminals profit from poaching wildlife and stealing natural resources. The Committee's continued strong support for international conservation, notably through the END Wildlife Trafficking Act of 2016, has strengthened both America's long-term foreign policy objectives as well as enhanced U.S. economic and national security interests around the world.

Security risks arising from resource degradation are increasing in many developing countries. Loss of natural capital, such as forests, fresh water, and natural pollinators, is accelerating due in part to

[redacted]

climate change. This loss contributes to instability, conflict, radicalization, and, in the worst case, failed States. U.S. leadership on these critical issues is invaluable.

Climate Change, National Security, and Nature

The impacts of climate change are being felt across our country and in every region on Earth. Wildfires have scorched California, hurricanes are taking heavy tolls, coral reefs are dying, and years-long droughts are rendering barren vast stretches of agricultural land. In fact, according to a report by Morgan Stanley, climate disasters cost the world $650 billion over the last three years, and the National Oceanic and Atmospheric Administration reported that 14 weather and climate disasters in 2018 cost the United States $91 billion in 2018, the fourth hottest year on record. And these impacts are set to accelerate – with global temperatures across land and sea already 1.5 degrees Fahrenheit above the 20th century average in 2018[1]. In the face of these natural disasters, greenhouse gas emissions, the main driver of climate change, aren't decreasing. In fact, they are going up. The 2018 IPCC special report "Global Warming of 1.5°C" found that the world is on track to blow past the limit at which runaway climate change will upend life as we know it. With business-as-usual trends, damages associated with global warming could total $54 trillion by 2040[2]. The urgency of accelerating climate action has never been clearer.

We know action is needed at the global level. In developing countries, the agriculture sectors absorb 26% of total damage and losses from climate-related disasters, according to a report by the Food and Agricultural Organization[3], and as a result, between 2008-2015, an average of 26.4 million people were displaced annually by natural hazard-induced and climate-related disasters. Climate-induced displacement has led to unprecedented migration, including from Central America and the future stability and well-being of the U.S. in part depends on making the world more stable, safe, and secure. However, the rising threat of climate change and associated natural resource scarcity and biodiversity loss increases the risk of conflict and instability in many regions around the world, including some of strategic importance to the United States. As a result, our national and economic security interests depend on the stability of our planet's climate and the integrity of our wildlife and natural resources, which sustain societies and economies around the world and enhance their climate resilience.

A Natural Solution

Our approach to protecting, sustainably managing, and restoring our natural ecosystems around the world requires engaging a range of actors – including governments, local communities, states, civil society, and the private sector. There is strong scientific consensus that the path to avoiding dangerous climate change risks to national security requires urgent transformation across all scales and sectors, including rapid energy transition, technological innovation, and natural climate solutions. Over the last few years, there has been increasing consensus and scientific certainty on the

[1] https://www.cnbc.com/2019/02/14/climate-disasters-cost-650-billion-over-3-years-morgan-stanley.html

[2] https://www.nytimes.com/2018/10/07/climate/ipcc-climate-report-2040.html
[3] http://www.fao.org/3/I8297EN/i8297en.pdf

role of nature as a climate solution. On an annual basis, nearly one fourth of emissions at the global level come from land use change – with 11% of global emissions from tropical deforestation alone. Trees and soils store vast amounts of carbon and when forests are burned or cleared to allow for agricultural expansion, urban development, and timber extraction, that carbon is emitted. And currently, we know that protecting, sustainably managing, and restoring forests will get us about a third of the way to keeping temperature rise no more than1.5 degrees Celsius (2.7 degrees Fahrenheit) above pre-industrial levels, providing 37% or more of the emissions reductions and removals needed. Natural ecosystems are the original carbon-sequestration technology, and they are an indispensable part of the solution to climate change. Stopping climate change will require reducing emissions, in all ways, including increased efficiency in current energy production and usage, increased used of cleaner sources of energy, and natural climate solutions.

What may be even more relevant relative to national security, however, is that natural climate solutions also provide significant benefits to reduce or alleviate the impacts of climate change. Nature's climate solutions are immediately available, cost-effective, and achieve both climate mitigation and adaptation results. For example, restoration of mangroves, wetlands, reefs, and coastal ecosystems can provide measurable storm protection benefits to coastal communities. With the frequency of intense events increasing and more than 60% of the global population living on coasts, natural climate solutions can provide a low-cost and sustainable solution to reducing climate risk. Additionally, forests provide natural flood protection, and water filtration. Agroforestry and climate smart agriculture practices can increase the resilience of production systems. Therefore, many of nature's climate solutions not only help mitigate the causes of climate change, but also can reduce risk, and therefore contribute to more security and stability in vulnerable regions around the world – which could reduce the economic cost of losses and damages and potentially, stem the tide of climate-induced migration.

Conservation International has been working with partners around the world to accelerate action on climate change. We develop cutting edge science, work with partners to design sustainable landscapes and protect marine ecosystems, foster innovative financing, and advise on policy at the local, national, and international levels. We envision a world where nature's contribution to addressing climate change is fully realized. This means that natural climate solutions are implemented to their fullest potential for mitigating climate change and are also fully deployed in places where ecosystems can help vulnerable populations adapt to the already-present and future effects of climate change.

International Conservation Programs

By investing in proven, U.S.-led, international conservation programs that help less-developed countries better manage their natural resources and protect their forests, fisheries, and wildlife from bad actors and natural disasters, countries can increase their resilience to climate change with natural climate solutions, and the United States can better protect its own national and economic security.

The following programs exemplify the critical role international conservation efforts play in U.S. foreign policy. Promoting "natural security" boosts America's national security:

The U.S. Agency for International Development (USAID) **biodiversity programs** deliver the majority of U.S. international conservation assistance on the ground. In partnership with foreign governments, civil society, the private sector, and local communities, the programs help protect some of the largest, most at-risk natural landscapes and species. By maintaining and restoring the natural resources that supply fertile soil, clean water, food, and medicine and tackling global challenges such as wildlife trafficking, USAID biodiversity programs strengthen U.S. foreign policy objectives by bringing aid millions of people, strengthening local economic growth, stability, democracy-building, health, and security. These all, in turn, can strengthen communities' resilience to climate change impacts.

The U.S. Fish and Wildlife Service (FWS) manages programs that conserve our planet's rich wildlife diversity, protecting habitats, fighting illegal wildlife trade, and building capacity for wildlife conservation. The International Wildlife Trade program provides oversight of domestic laws and international treaties that promote the long-term conservation of plant and animal species. The Multinational Species Conservation Fund works to conserve iconic species like elephants, rhinos, tigers, great apes, and marine turtles. The FWS regional programs support grassroots, on-the-ground conservation work that addresses global threats to endangered species and other wildlife, while promoting civil society and international partnerships that enhance U.S. foreign policy objectives and national security.

The Global Environment Facility (GEF) is an independent global financial institution that provides grants to support sustainable use and improved management of natural resources, uniting countries with corporations and non-profit organizations. With more than 4,500 projects in 170 countries, the GEF is the largest single financier of conservation. Every U.S. dollar contributed to the GEF generates significant return through strategic investments that bring together governments, civil society, the private sector, and other partners to tackle the planet's biggest issues, including preventing tropical deforestation, combating wildlife trafficking, protecting global fish stocks, and promoting sustainable economic growth in the developing world.

The Tropical Forest Conservation Reauthorization Act (TFCA) was signed by the President on January 14th, 2019. Since 1998, the TFCA program has saved more than 67 million acres of tropical forest by allowing developing countries that meet certain criteria to be relieved of debt owed to the United States in exchange for their conservation efforts. Known as debt-for-nature swaps, these agreements demonstrate the U.S. Government's commitment to helping fledgling democracies while protecting U.S. economic and national security interests. The reauthorization expands these efforts to coral-reef ecosystems. To date, the TFCA program has sequestered 56 million metric tons of carbon dioxide, which is the equivalent of taking 11.8 million cars off the road.

Each of the programs described play a significant role in preserving wildlife, biodiversity, and sustainable landscapes that all have an integral component towards mitigating the impacts of climate change that are being felt across our country, every region on Earth, and are impacting our own national security.

Thank you for your leadership in holding this important hearing. Conservation International values the role our natural environment plays in mitigating the U.S. national and economic drivers of instability related to climate change. We look forward to working together to continue to develop policies that can help to accelerate action on climate change.

Sincerely,

Jennifer Morris
President
Conservation International

Statement for the Record from Representative Gerry Connolly
How Climate Change Threatens U.S. National Security
April 2, 2019

"Global 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." These are the words of the U.S. Intelligence Community in its 2019 Worldwide Threat Assessment, which identifies climate change as one of the pressing global threats to U.S. national security. As some still debate the existence of man-made climate change, meanwhile the Department of Defense (DoD) has acknowledged the reality of its impact on our military posture and made sizeable investments to mitigate its harmful effects. Climate change is also a major driver of instability and economic losses around the world, both of which threaten U.S. national security interests.

Despite the overwhelming consensus among scientists, national security officials, and foreign governments that climate change is real and presents a shared global threat, President Trump and his Administration have taken drastic measures to halt progress against this challenge. In June 2017, Trump announced that the U.S. would pull out of the Paris climate accord, a pivotal climate change agreement that has now been signed by every other nation on Earth. His Administration has systematically scrubbed mentions of climate change from websites across the federal government. And now the President is reportedly considering a proposal to create a Presidential Committee on Climate and Security to counteract the findings of his own defense and intelligence officials that climate change is a threat to national security.

According to a January 2019 DoD report, "the effects of a changing climate are a national security issue with potential impacts to DoD missions, operational plans, and installations." Of the 79 installations addressed in the report, two-thirds are vulnerable to recurrent flooding, more than one-half are vulnerable to drought, and about one-half are vulnerable to wildfires. In response to these vulnerabilities, DoD has incorporated climate resilience as a cross-cutting consideration in its planning and decision-making processes.

In addition to threatening our military installations, climate change contributes to competition over resources, which can lead to conflict and instability. As Former Secretary of Defense Jim Mattis said, "climate change can be a driver of instability and the Department of Defense must pay attention to potential adverse impacts generated by this phenomenon." According to the 2018 Global Report on Internal Displacement, 61 percent of new internal displacements were triggered by disasters, compared with 39 percent by conflict. The World Bank has estimated that by 2050, more than 140 million people in sub-Saharan Africa, South Asia, and Latin America could be driven from their homes as "climate migrants." It is critical for our government to understand the link between climate change and migration, so that we can direct resources where appropriate to strengthen resilient communities and mitigate harm.

In November 2018, the Trump Administration released the Fourth National Climate Assessment (NCA), which assesses the science of climate change and variability and its impacts across the United States. According to that report, "without substantial and sustained global mitigation and regional adaptation efforts, climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century." While industries that depend on natural resources and favorable climate conditions, including agriculture, tourism, and fisheries, are especially vulnerable, American businesses across the board rely heavily on global supply chains that will suffer price increases in products and crops. The NCA report emphasizes that the Midwest will be disproportionately affected by higher temperatures, drought, and flooding, resulting in a potential 75 percent drop in corn production and 25 percent loss of its soybean yield. Altogether, the report projects annual losses of hundreds of billions of dollars in some economic sectors by the end of this century.

The United Nations Intergovernmental Panel on Climate Change recently warned that the point of no return on climate change may be less than twelve years away. It is clear that climate change presents an urgent and monumental threat to U.S. national security. The time to act is now, before it is too late.

Questions for the Record from Representative Albio Sires
How Climate Change Threatens U.S. National Security
April 2, 2019

Question:

Climate change is not a far-off concern in the Caribbean. Its effects are already being felt in the form of lengthy droughts, constant flooding, rising sea levels, and increasingly frequent and severe hurricanes. What has been the impact of U.S. disaster preparedness programs in the Caribbean and what more can the U.S. be doing to support disaster risk reduction and climate change adaptation efforts in the region?

Answer:

Ms. Sherri Goodman: The United States Agency for International Development (USAID), the Office of U.S. Foreign Disaster Assistance (OFDA), the United States Southern Command (USSOUTHCOM), and other U.S. departments and agencies have made significant investments in recent years to improve the disaster response capacities in the Caribbean. Disaster preparedness assistance helps to reduce human suffering and property loss in the region and maintains the U.S.' influence and access across the Caribbean Basin. These efforts support the Caribbean 2020 Strategy, under the U.S.-Caribbean Strategic Engagement Act of 2016 (H.R. 4939) and respond to priorities outlined by the Caribbean Community (CARICOM), when the Organization's representatives met with Vice President Pence, Deputy Secretary of State John Sullivan, and USAID Administrator Mark Green during 2018's Summit of the Americas in Lima, Peru.[1]

Our continued aid, engagement, and presence across the Caribbean Basin (home to almost 45 million people) is of great importance, especially at a time when China is investing heavily in the region, presumably with the intent of supplanting the U.S. as the region's economic partner of choice.[1] China's increased economic and political ties to the Caribbean represent a hemispheric strategic challenge that the U.S. should counter by demonstrating to Caribbean states that America's priorities are *their* priorities.

Nevertheless, though significant gains continue to be made on the disaster preparedness front, there is justifiably growing concern that not enough is being done to prepare the Caribbean Basin for risks and consequences that extend well beyond the traditional variety of risks and shocks. Climate change presents an existential risk to the Caribbean community, because the phenomenon not only threatens to compound traditional disaster risks, but to introduce new ones, as well. There is little doubt that disaster preparedness, to include mitigating the kinds of destructive scenarios

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[1] Tannenbaum, B. (2018, April 3). Filling the Void: China's Expanding Caribbean Presence. Retrieved April 19, 2019, from http://www.coha.org/filling-the-void-chinas-expanding-caribbean-presence/.

that climate change threatens to put in motion, is a regional imperative. As such, expanding and deepening our cooperation with the region on disaster preparedness in such a way that planning for climate change is incorporated into the front end of other critical strategic planning efforts, so climate-related imperatives are addressed in tandem, is arguably the most effective way for us to demonstrate that the American people are supportive of the region's strategic priorities.

On the domestic front, changes made in 2018 in the form of the Disaster Recovery Reform Act (that was enacted into law as Title XII of the Federal Aviation Administration Reauthorization Act) will enable the rebuilding of critical infrastructure that has been damaged or destroyed by natural disasters in a more resilient manner. This Title also contains measures to facilitate disaster preparedness and mitigation, as one avenue to address these expanding concerns.

According to the Intergovernmental **Panel** on **Climate Change** (IPCC) *Report for Policy Makers* (2014), "Increasing warming amplifies the exposure of small islands, low-lying coastal areas and deltas to the risks associated with sea level rise for many human and ecological systems. Further, although the number of storms is not expected to increase, the projections are that they will be more intense with higher rainfall rates and increased maximum winds.[2] Caribbean economies also tend to be dependent on tourism, export agriculture, and other sectors that may be sensitive to climate impacts, including sea level rise, storms, and changing rainfall patterns. Poor or antiquated critical infrastructure, such as water distribution networks, roadways, and electricity grids further compound resiliency-building challenges.

Of growing concern to me is how these environmental changes and resource vulnerabilities may combine with pre-existing state fragilities (e.g., high unemployment that leads to economic instability, as well as weak governance, lack of political will and leadership, and weak institutions and infrastructure) to affect the security of regional states and U.S. national security, as a result. The Caribbean Disaster Emergency Management Agency (CDEMA) hosted a climate change–national security event in December 2018 to facilitate a dialogue concerning the underlying Caribbean security risks that are likely to be exasperated by climate change. The event produced the outline of an action plan explaining how the climate resilience agenda will be advanced from a climate change and national security perspective. This event, and promised next steps, should be seen as a signal that the Caribbean has a growing appreciation of the dangers manifest at the nexus of traditional security threats and climate change.[3] At that time (i.e., December 2018), my colleagues at the Center for Climate and Security also published a report, which demonstrated and

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[2] IPCC, 2014: Summary for policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

[3] Fetzek, S., & Barrett, O. (2018, December 15). Caribbean policy brief draft – Climate security drivers in the Caribbean. Retrieved April 20, 2019, from https://www.cdema.org/Caribbean_policy_brief_-_Climate_security_drivers_in_the_Caribbean.docx.pdf.

underscored some of the ways in which natural disasters and climate change impacts can converge with "long-standing state vulnerabilities/fragilities" to compound development woes across many of the region's small islands.

It is important to note that climate change as a "threat multiplier" for traditional economic, social, and security vulnerabilities likely will not be limited to the territorial and maritime confines of the Caribbean Basin. The contemporary historical record shows that during periods of war, natural disasters, and severe economic stresses, the at-risk populations look for safe havens in America. The U.S., in many instances, has opened its doors to the tens of thousands of war and natural disaster refugees from Central America (e.g., El Salvador, Honduras, and Haiti) who, if forced to return home, would face life-threatening conditions.[4] The climate–security nexus (i.e., climate as a "threat multiplier") is not an over-the-horizon risk, but a near-term imperative, so I welcome the fact that the Caribbean emergency and disaster response entities (e.g., CDEMA) have already taken initial steps to meet these challenges, but they need help.

There are several actions that the U.S. government can take to facilitate such assistance, as follow here and *in response to Question #2*.

Additional Recommendations:

- The recent *Ministerial for the "U.S.-Caribbean Resilience Partnership* contains recommendations to improve disaster response, including: **through U.S. assistance to the Caribbean; and, through civil-military coordination and training.** Congress should not only support these two lines of efforts but should build on them by integrating climate-related security considerations.
- The United States-Caribbean Strategic Engagement Act of 2016 (H.R. 4939) should be amended – or related strategic and/or other implementation documents – to incorporate climate-related risks and resilience planning at the front end and should tie these to the development challenges facing the region.
- A greater appreciation by decision-makers of the interrelationship between climate change and foreign policy and national security objectives should be encouraged to continue to enhance the "mainstreaming" of climate change and resource management issues and strategic planning into these arenas. Relatedly, more complex, real-world scenarios -- the ones that climate change impacts can help to produce -- should be planned and "exercised" more.

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[4] Cohn, D., Passel, J. S., Bialik, K., Cohn, D., Passel, J. S., & Bialik, K. (2019, March 08). Many immigrants with Temporary Protected Status face uncertain future in U.S. Retrieved April 20, 2019, from https://www.pewresearch.org/fact-tank/2019/03/08/immigrants-temporary-protected-status-in-us/.

Mr. Paul Weisenfeld: Chairman Sires, thank you for your question and for your commitment to the region. I am honored to have had the opportunity – both in my current role at RTI International (RTI) and previously at USAID – to work on a variety of U.S. assistance programs in the Western Hemisphere. These programs would not be possible without the continued bipartisan support of this Committee and leaders like you.

As you know, many countries throughout Latin America and the Caribbean (LAC) are particularly vulnerable to volcanic activity, forest fires, and earthquakes, as well as extreme climate change-related events like hurricanes and droughts. The costs of these extreme weather events cannot be overstated: globally, between 1998 and 2017, "[w]hile the majority of fatalities were due to geophysical events, mostly earthquakes and tsunamis, 91% of all disasters were caused by floods, storms, droughts, heatwaves and other extreme weather events."[5] Climate-related changes such as increasing temperatures, rising sea levels, less predictable agricultural seasons, and stronger and more frequent hurricanes threaten lives and livelihoods in the Caribbean, impacting both human safety and economic opportunity.

During my time at RTI, I have witnessed these challenges through our work implementing the Regional Disaster Assistance Program (RDAP), funded by USAID's Office of Foreign Disaster Assistance (OFDA).[6] Through this program, RTI assists OFDA to maximize response, planning, training, and risk reduction efforts in 27 LAC countries, including 14 Caribbean nations.

In addition to deploying individuals and teams to support response efforts in countries within 24 hours of when a disaster occurs, the RDAP also shares with partner country counterparts new knowledge and best practices in disaster response and preparedness in areas such as urban search and rescue (USAR), which includes first responder training, incident command system (ICS) set up, hazmat training, and basic life support, among other topics.

This approach emphasizes capacity building in conjunction with response efforts to increase partner countries' ability to mitigate and respond to climate-related and other shocks. For example, government officials and regional partners are now able to complete online trainings that cover several USAR topics using RDAP materials which are currently available on a platform that has capacity for 300 simultaneous trainees. This online training is being expanded in partnership with the local partners throughout LAC to include more topics and allow wider audiences to access standardized, high-quality training. Through the RDAP, we are also supporting efforts to institutionalize disaster risk reduction (DRR) through local and national educational systems. The project is working with local teachers and principals to include DRR in secondary and primary school curricula. In addition, DRR is incorporated into higher education curricula via public-private partnerships and regional university networks such as the Latin American and Caribbean University Network for DRR (REDULAC).

I urge Congress to continue funding these critical programs as a means to support disaster risk reduction and reduce vulnerability to climate shocks in the region. Continuing these types of smart investments – in tandem with long-term economic growth and infrastructure efforts – allows the U.S. Government to maintain its long-standing tradition of American generosity in times of crisis,

[5] https://www.preventionweb.net/files/61119_credeconomiclosses.pdf
[6] https://www.rti.org/impact/building-disaster-resilience-latin-america-and-caribbean

while also contributing to countries' self-reliance. While we cannot prevent natural disasters from occurring, we can help partner nations – many of whom are current or future trade partners – to prepare for and respond to crises on their own.

Question:

Looking ahead, what should be the top national and regional priorities for strategic planning on disaster preparedness and disaster-related assistance and recovery in the Caribbean? Do these priorities align with current national initiatives or those being undertaken by the United States and other actors?

Answer:

Ms. Sherri Goodman: Continued development assistance to the region is essential. This priority likely could be elevated by Congress and the national security and foreign policy communities. In addition, a "whole-of-government" approach would facilitate proactive and response efforts, including incorporating resource management and climate projections into strategic planning efforts at the front end. The Caribbean should continue to better prepare for traditional risks posed by natural disasters and extreme weather events that are expected to be exacerbated by climate change in the future and incorporate updated predictions into strategic infrastructure, security, and foreign policy planning, and related emergency preparedness and response planning, efforts on the front end. Since climate change refers to trends, forecasting can be more difficult. Fortunately, forecasting and predictive tools and analytics are improving to facilitate such efforts. The U.S. should continue to promote multi-national and multi-sectoral strategies that enhance the adaptive capacity of the region to cope with climate change impacts and mitigate the causes of climate change in a coordinated, effective and sustainable manner. It also should enhance research and development efforts to further improve predictive capabilities, analytics, and methods.

Disruptions to economic development, and related political instability or conflict witnessed in recent years in the Caribbean and other resource-scarce parts of the world that are especially vulnerable to the projected impacts of climate change, could give rise to emigration.[7] Climate change effects threaten the region's development significantly, also due to the potential spread of pandemic diseases, so health issues that have implications for U.S. security and foreign policy objectives also must be addressed.

Mr. Paul Weisenfeld: Looking ahead, U.S. Government strategic planning for disaster preparedness and disaster-related assistance and recovery in the Caribbean must continue to supplement immediate disaster response by building the capacity of local responders and disaster response systems and improving the resilience of vulnerable populations to recurring shocks, thus advancing the region's journey to self-reliance.

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[7] Fetzek, S., & Barrett, O. (2018, December 15). Caribbean policy brief draft – Climate security drivers in the Caribbean. Retrieved April 20, 2019, from https://www.cdema.org/Caribbean_policy_brief_-_Climate_security_drivers_in_the_Caribbean.docx.pdf.

With the understanding that natural disasters will continue to occur, over time the RDAP coordinated with OFDA to shift its emphasis from disaster response to also include capacity building and disaster risk reduction (DRR). As I observed during my time coordinating the U.S. Government response to the devastating 2010 earthquake in Haiti, the ability of a community to quickly and effectively respond to and recover from a disaster ultimately hinges upon existing local capacity.

At the same time, we must approach ongoing, long-term economic growth efforts through a resilience lens. These programs are helping to build up and bolster existing structures and systems so that countries are better able to withstand and bounce back from climate-related and other threats, thus protecting hard-won development gains. Through the RDAP project and similar activities, OFDA is already addressing these above-listed priorities and helping countries in the Caribbean to better manage crises and sustain themselves and their populations in the long-term.

Question:

Chile is among the countries most vulnerable to the impacts of climate change. Its government has responded with a National Action Plan and taken steps to reduce carbon dioxide emissions and improve climate resilience. 47% of the energy consumed in the country comes from renewable sources, aiming to reach 60% by 2035 and 90% in 2050. Energy has been the top investment sector during the last three years, demonstrating the commitment of the private sector. What can other countries learn from Chile's example in taking decisive action to mitigate the impacts of climate change?

Answer:

Ms. Sherri Goodman: Most island nations and virtually all other nations have promulgated Nationally-Determined Commitments and some form of National Action Plan on Climate Change, with clean energy and energy efficiency often featuring prominently in those plans, as well as significant adaptation measures. Energy remains a strategic vulnerability for the region, which, given the high dependence on foreign energy sources could increase the region's overall economic vulnerability. Electricity prices in the Caribbean are among the highest in the world, due to oil imports and increasing economic pressures in the region.

China and Russia are rushing to move into developing countries to develop strategic energy and mineral resources, and thereby enhance their geopolitical power and strength across regions and the globe. The U.S. must maintain its leadership position in the world, continue to engage, and continue to pursue competitive economic development opportunities in key countries and regions. Energy, particularly clean energy development (such as solar and wind), is a key area in which to do so.

In addition, many of the larger Caribbean nations have taken measurable actions to facilitate multi-sectoral approaches as well as to raise the profile of climate change by assigning responsibility for

this issue via a named portfolio in their respective governments. Further, like Chile, most Caribbean states appreciate the cross-cutting nature of climate change and that there is a need to develop an integrated approach in order to effectively build resilience at all levels. [8]

In 2002, the Caribbean Common Market (CARICOM) took a major step in self-organizing to address the climate change challenge, when it established a regional climate change coordinating mechanism, namely, the Caribbean Community Climate Change Centre (CCCCC). The so-called "5-Cs" mandate is to "support the people of the Caribbean as they address the impact of climate variability and change on all aspects of economic development." The Centre not only provides "timely forecasts and analyses of potentially hazardous impacts of both natural and man-induced climatic changes on the environment," but is also an Accredited Entity (AE) (i.e., through the Green Climate Fund) authorized to enable member states to access United Nations' funding for climate adaptation and mitigation programs and projects.

Additional Recommendations:

Specific lines of actions to be pursued include:

- Encourage government ministries and agencies to showcase best practices and serve as models for their societies in terms of deploying renewable energy and energy efficiency technologies and policies;
- Diversify electricity and fuel supplies to the greatest extent feasible, particularly toward clean energy resources, with ambitious goals for deploying renewable resources and energy efficiency; and,
- Modernize energy infrastructure, including through the use of advanced grid technologies and capabilities.

Question:

We know that natural disasters often force people to flee their homeland. In the last 20 years, the U.S. has provided temporary protected status to individuals from countries like Honduras and Haiti, who were displaced by natural disasters. Unfortunately, this administration is working to end the TPS program, a decision that I strongly oppose. Do you predict that climate change will contribute to increased migration from Central American and Caribbean countries and what policies should we consider to address this challenge?

Answer:

Ms. Sherri Goodman: Yes, because climate change is projected to exacerbate the impacts on already-scarce resources, such as food, water, and energy, particularly in areas prone to droughts

[8] Climate Change Policy Framework for Jamaica. (2015, September 12). Retrieved April 20, 2019, from http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/05/Jamaica-Climate-Change-Policy-fwL-2015.pdf, authored by: Ministry of Land Water and Climate Change.

and floods that are dependent on agriculture, herding, or fishing for their livelihoods. Thus, climate change could be a factor that contributes to increased movements of populations within and/or across borders in or from Central America and the Caribbean.

Unfortunately, as you noted, the TPS status of some nations is threatened. This comes at a time when nations in the region are facing threats from economic and political instability, drug and gang violence, compounded by extreme weather events. For example, some in El Salvador, Honduras, and Nicaragua are struggling to overcome a protracted drought, which continues to fuel a *step migration* process. Thus, I recommend the following measures.

Additional Recommendations:

- Continue/extend TPS for countries facing crises, such as El Salvador, Haiti, Honduras, and Nicaragua.
- The U.S. Department of Homeland Security should engage CARICOM (including with involvement from CDEMA and CCCCC, as appropriate) to formulate contingency plans for more likely mass migration scenarios.
- Invite CDEMA, as appropriate, to participate in U.S.- sponsored mass migration exercise scripting (e.g., Department of Homeland Security's *Integrated Advance*).
- Relatedly, plan and "exercise" more complex, real-world scenarios -- the ones that climate change impacts are likely to yield.

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[i] The U.S. States-Caribbean Strategic Engagement Act of 2016 bill declares that it is U.S. policy to increase engagement with the governments of the Caribbean region, including the private sector, and with civil society in both the United States and the Caribbean. The Department of State shall submit to Congress a multi-year strategy for U.S. engagement to support the efforts of interested nations in the Caribbean region that identifies State Department and U.S. Agency for International Development (USAID) priorities for U.S. policy towards the Caribbean region.

Questions for the Record from Representative Chris Smith
How Climate Change Threatens U.S. National Security
April 2, 2019

Question:

There is a lot of bipartisan support for our Power Africa initiative.

a. Can you elaborate on Power Africa's objectives, particularly with regard to the expanding the power grid and building resiliency?

Answer:

Mr. Paul Weisenfeld: Representative Smith, let me begin by thanking you for your long-standing and passionate support for U.S. investments in Africa – especially your early support for USAID's Power Africa program and its establishing legislation, the Electrify Africa Act of 2015 (PL 114-121). The continued success of this critical program is dependent on champions in Congress like you.

As you know, Power Africa was launched in 2013 in order to increase access to power in sub-Saharan Africa by leveraging technical and legal experts, the private sector, and governments from around the world. Power Africa's goal is to add more than 30,000 megawatts of cleaner, more efficient electricity generation capacity and create 60 million new home and business connections.[1]

At RTI, we are proud to be implementing two Power Africa programs: the Power Africa Off-Grid Project and the East Africa Energy Program. The Power Africa Off-Grid Project is a four-year program that provides technical assistance and targeted grant funding to support the development of Africa's off-grid solar home system and mini-grid sectors. To date, the larger Power Africa initiative this program supports has worked with approximately 150 off-grid companies and investors in over 10 sub-Saharan African countries.

The East Africa Energy Program is a four-year project that aims to expand affordable and reliable electricity services in East Africa. It focuses on optimizing the region's power supply, increasing grid-based power connections, strengthening utilities, and increasing the region's power trade.

Mr. Barry K. Worthington: The launch of Power Africa 2.0 in 2018 increased the initiative's focus on expanding and strengthening transmission and distribution grid infrastructure. Transmission in particular will play a key role in unlocking greater power supply and facilitating electricity trade between neighboring countries. To date, many African governments and development partners have focused on advancing country-based approaches to power generation and transmission. As a result, some countries now have national supply surpluses and stranded power assets, while others face critical supply shortages. The ability for electricity trade to flow from areas of surplus to areas of demand is severely constrained, within and across

[1] https://www.usaid.gov/powerafrica/aboutus

borders. Expanded transmission infrastructure enables regional trade, which enhances resiliency and energy security. Specifically, regional transmission enables the development of more cost-efficient energy resources - even when they are located in remote areas far from major population centers. It also helps regions achieve greater economies of scale in electricity generation, resulting in reduced costs and enhanced affordability for end-users. Finally, regional transmission enhances security by creating a larger, more diverse energy portfolio that helps insulate individual countries from unexpected events like drought.

In 2018, Power Africa published its Transmission Roadmap to 2030, which aims to enhance cooperation among major stakeholders by identifying the transmission projects most critical to cross-border electricity trade and highlighting bottlenecks and risks of delay. Power Africa identified 18 priority transmission projects in East, West, and Southern Africa, and prioritized them based on their potential to unlock regional trade, their scheduled completion time, and the feasibility of resolving the bottlenecks they face. Together these projects represent the potential for a combined installed capacity of 11,000+ megawatts (MW) and 7,200+ kilometers (km) of lines. The Transmission Roadmap also proposes an Action Plan to facilitate accelerated action in the development partner community, building on existing efforts at the sub-regional level. This will enable public and private stakeholders to identify potential gaps in the support provided to priority projects and facilitate cross-regional dialogue to address these gaps.

Power Africa is already providing concrete support to the transmission sector. In Southern Africa, USAID has embedded a full-time Project Coordinator to manage the development of a 560 km, 400 kV transmission line needed to evacuate power from a planned 400 MW gas plant in Mozambique. In addition, the U.S. Trade and Development Agency (USTDA) is providing transmission design advisory services to the planned Mozambique-Zambia 400 kV transmission interconnector, including detailed design and technical inputs for tender documents for the engineering, procurement and construction contractor.

Power Africa's expanded focus on transmission has also leveraged increased resources from our development partners. In May 2018, USAID Administrator Mark Green signed a Memorandum Of Understanding between Power Africa and the Republic of Korea. In this agreement, the Republic of Korea committed to adding 1,000 kilometers of transmission lines in Africa and providing $1 billion in power sector investment.

Question:

b. How do efforts to enhance resiliency with respect to Power Africa interact with our national security objectives in Africa?

Answer:

Mr. Paul Weisenfeld: As you know, access to electricity is not just an economic issue – it touches every aspect of society. Administrator Green outlined this connection best in the most recent Power Africa annual report, stating, "Lack of access to electricity in much of sub-Saharan Africa does more than just stunt economic growth. It leaves large swaths of population trapped in living conditions that make economic progress nearly impossible. It reduces the potential of agricultural yields, and the effectiveness of health care delivery." [2] As we have seen through our work, when access to reliable and affordable electricity is threatened, community cornerstones such as businesses, schools, and hospitals struggle to operate.

Helping governments fulfill their responsibility of ensuring reliable access to energy for their communities promotes prosperity and security. As you know, communities that do not have viable opportunities for prosperity or suffer from weak governance are those most vulnerable to instability, including disease outbreaks, migration, and extremism – all of which threaten U.S. investments and interests not only in Africa but our national security here at home too. We have seen this most acutely with the Ebola outbreaks in West Africa in 2014 and the rise of extremist groups throughout Africa. Ensuring reliable and affordable access to power, and thus enhancing communities' resilience, is an important and cost-effective piece of preventing these types of threats before they emerge.

For this reason, our Power Africa Off-Grid Project is collaborating with the Office of Transition Initiatives (OTI) at USAID to help counter violent extremism by strengthening civil society and promoting economic growth through off-grid electrification in multiple countries in West Africa. Electrification will enable rural communities in this region to access a variety of technologies, including wireless communications, water pumps, computers, lighting, refrigeration, and medical equipment. In turn, access to these technologies will promote economic growth in the education, food security, health, information, and public spaces – thereby strengthening the communities' resilience and, ultimately, our U.S. national security.

Mr. Barry K. Worthington: Power Africa's efforts to strengthen, diversify, and expand power systems across sub-Saharan Africa makes countries more resilient to economic and environmental shocks. With enhanced stability and resilience, countries are able to plan their future power systems more proactively and on longer time horizons, providing increased clarity and transparency to the private sector. In addition, this helps ensure that rather than procuring power in moments of crisis, African countries will continue the trend of procuring power competitively, opening up expanded opportunities to US firms and like-minded partners.

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[2] p1, https://www.usaid.gov/sites/default/files/documents/1860/2018-Annual_Report1015_508.pdf

Question:

c. To what extent does our Power Africa initiative attempt to be "climate change neutral?"

Answer:

Mr. Paul Weisenfeld: At RTI, we are proud to be implementing two Power Africa programs: the Power Africa Off-Grid Project and the East Africa Energy Program. These two projects' scopes of work focus on increasing access to electricity with the ultimate goal of supporting development priorities, including inclusive economic growth, security, and improved health and education outcomes. To achieve these goals, our teams focus on leveraging private sector engagement, driving economic development, and encouraging productive uses and outcomes related to health, education, agriculture, and more. While "climate change neutral" is not a stated objective of the programs, our work does include a variety of energy low-emissions energy generation and distribution technologies both on- and off-grid, including solar home systems and mini-grids.

Mr. Barry K. Worthington: Per the Electrify Africa Act of 2015, Power Africa promotes an "all-of-the-above energy development strategy" that focuses on advancing a diverse portfolio of solutions that align with both market demand and the development objectives of African countries. This includes oil, natural gas, coal, hydropower, wind, solar, and geothermal. To date, approximately two-thirds of the generation projects that Power Africa has supported have been renewable.

