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**The Cost of Inaction: The Economic and Budgetary Consequences of Climate Change**

Chairman Murray, Ranking Member Sessions, and Committee members, I thank you for inviting me to testify today.

**INTRODUCTION: CNA MILITARY ADVISORY BOARD: MILITARY LEADERSHIP AND CLIMATE RISKS**

I am Sherri Goodman, and I am privileged to serve as the founder and Executive Director of CNA's Military Advisory Board—MAB for short. In this capacity, I am here today representing not only my views on the national security implications of climate change, but also the collective wisdom of the 16 Admirals and Generals who serve on CNA's MAB.

This board first convened in 2006 to look at pressing national security issues, including climate change. Our first report, published in 2007, identified climate change as a threat multiplier, especially in fragile regions of the globe. Since that first report, we have had over 30 Generals and Admirals serve on the on the board, collectively with more than one thousand years of experience in evaluating security threats and mitigating risks. Our most recent report, which I would like to submit for the Record, identifies the accelerating risk of climate change and observes that in some circumstances climate change has, and increasingly will, serve as a catalyst for conflict.

To explain how the accelerating risk of climate change may impact the U.S. budget from a national security perspective, I will focus on the following four areas:

- First, global trends that will contribute to instability around the world;
- Second, the Arctic;
- Third, military readiness; and,
- Fourth and finally, U.S. National Power.

My discussion today is informed by the MAB and reflects its members' most recent findings, but what follows are my own views and observations.

### **I. GLOBAL TRENDS: ACCELERATING RISKS**

In the seven years that have passed since our initial assessment, we have witnessed more frequent and/or intense weather events, including heat waves, sustained heavy downpours, floods in some regions, and droughts in other areas. Nine of the ten costliest storms to hit the United States have occurred in the past 10 years, including Hurricane Katrina and Superstorm Sandy. Speaking for the MAB, we assess that the nature and pace of observed climate changes—and an emerging scientific consensus on their projected consequences—pose severe risks for our national security.

Having served for eight years as Deputy Undersecretary of Defense for Environmental Security, and for eight more years as Executive Director of the MAB, I have learned how our senior military leaders approach risk and uncertainty. To our military leaders, managing risk is seldom about dealing with absolute certainties but, rather, involves careful analysis of the probability of an event and the consequences, should the event occur. When it comes to our national security, very low probability events with potentially dire consequences often deserve consideration and contingency planning. Military leaders evaluate the probability and possible consequences of events in determining overall risk. Today, the risks posed by predicted climate change represent even graver potential than they did seven years ago, and require action today to reduce increased risks and potential impacts tomorrow.

### ***A. Four important global trends***

Four notable global trends will exacerbate these accelerating risks. First is global population growth: One-half billion people have been added to the world's population since the MAB completed its first report in 2007 and another one-half billion will be added by 2025. Most of this growth is in Africa and Asia, two of the areas projected to be hardest hit by climate change.

The second trend is urbanization: Nearly half of the world now lives in urban areas, with 16 out of 20 of the largest urban areas situated near coastlines. The result is that more of the world's population is at risk from extreme weather events, sea level rise, and storm surge.

The third trend is a global increase in the middle class, with an accompanying growth in demand for food, water, and energy. The National Intelligence Council predicts that by 2030, demand for food will increase by 35 percent, fresh water by 40 percent, and energy by 50 percent.<sup>1</sup> Another 2012 assessment by the U.S. intelligence community found that water challenges will likely increase the risk of instability and state failure, exacerbate regional tensions, and divert attention from working with the United States and other key allies on important policy objectives.<sup>2</sup>

The fourth and final trend is that the world is becoming more politically complex and economically and financially interdependent, which means that security risks to any one region of the world cannot be examined in isolation.

### ***B. Accelerating risks around the world affect U.S. national security***

The world around us is changing. In recent years, scientists have observed changing weather patterns manifest by prolonged drought in some areas and heavier precipitation in others. In the last few years, we have seen unprecedented wildfires threaten homes, habitats, and food

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1. National Intelligence Council, *Global Trends 2030: Alternative Worlds* (Washington, DC: Office of the Director of National Intelligence, December 2012).

2. Office of the Director of National Intelligence, *Global Water Security*. Intelligence Community Assessment ICA 2012-08 (Washington, DC: Office of the Director of National Intelligence, February 2, 2012).

supplies—not only across the United States, but also across Australia, Europe, Central Russia, and China. Low-lying island nations are preparing for complete evacuation to escape rising sea levels. Globally, recent prolonged drought has acted as a factor driving both spikes in food prices and mass displacement of populations, each contributing to instability and eventual conflict. For example, the MAB notes 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 sustain the Tunisian and Egyptian uprisings in 2011. Similarly, in Syria, five years of drought decimated farms and forced millions to migrate to urban areas. In overpopulated cities, these refugees found little in the way of jobs and were quickly disenfranchised with the government. The ongoing strife in Syria has been exacerbated by drought and rural to urban migration. In this way, climate change has worsened stress in a region already torn by political and ethnic tensions, serving as a catalyst for conflict.

We are concerned about the projected impacts of climate change over the coming decades on those areas already stressed by water and food shortage and poor governance. Such areas span the globe, and they present the greatest short-term threats. In the longer term, the areas that are at the greatest risk are those exposed to rising sea levels. There will be only so much we can do to keep the sea out, and in some areas the sea will not flow over the walls we build, it will flow under or around, making the land and aquifers unusable. Low-lying islands in the Pacific and great deltas, including the Mekong, the Ganges in Bangladesh, the Nile Delta in Egypt, the Mississippi Delta, and whole regions like the Everglades are increasingly at risk of being unable to support the populations that live there. Sea water inundation will drastically cut food production in many of these areas and cause millions to lose their ability to live on these retreating arable lands. In these areas and in others, migration could become a larger method of adaptation.

## II. ACCELERATING CLIMATE RISKS TO THE US HOMELAND

### ***A. The Arctic region is rapidly changing—and the U.S. needs to prepare***

The Arctic is a region experiencing rapid change. Over the past few years, we have seen an almost exponential rise in activity in the Arctic: more shipping, more resource extraction, and more posturing for control over the region's vast resources. The international community is not yet prepared to respond to an accident or disaster that could occur with increasing shipping and energy exploration in this fragile region, with its limited infrastructure and extreme operating conditions. In the Arctic, climate change challenges could serve as a catalyst for increased international cooperation.

While serving as Deputy Undersecretary of Defense in the aftermath of the Cold War, the U.S. worked with Norway, Russia, and others to manage waste streams from decommissioned Russian nuclear submarines, including some that had been dumped into the Kara Sea, north of the Arctic Circle. In helping Russia safely manage waste streams from nuclear ship operations, I became acutely aware of the unique Arctic environment. With increased shipping and greater opportunities for extraction of resources, the risk for a man-made crisis or disaster, such as a major oil spill, is rising.

A report of April 2014 on *Responding to Oil Spills in the U.S. Arctic Marine Environment* by the National Research Council finds that a spill in the Arctic, similar in size to that of the Deepwater Horizon accident in 2010 would have a devastating impact and the effects would last for decades. During the Deepwater Horizon response, technicians had continuous access to the sight and it still took three months to stop the leak and two more to seal it. Depending on the time of year, that level of access would not be possible in the Arctic. For the Horizon accident, responders mobilized hundreds of privately owned boats to control, contain, and ultimately disperse the surface oil slick. This simply would not be possible in the Arctic. As stated by the National Research Council, "In the presence of lower water temperature or sea ice, the processes that control oil weathering – such as spreading, evaporation, photo oxidation, emulsification, and natural dispersion—are slowed down or eliminated and capture of oil in

new ice can make the spill lasts for months.”<sup>3</sup> Simply put, the world is not prepared to respond to a major accident in the Arctic, be it from drilling or the transshipment of oil.

Some great work has been done across the U.S. government in putting together plans for increased future operations in the Arctic. The problem, though, is that the increase is happening *now*. Seventy-three ships sailed through the Northwest Passage in 2013, up from just four in 2007. Preparations for energy exploration are well underway—the Russians have already staked out claims over potential reserves by planting a flag on the deep seabed near the North Pole. My colleagues on the MAB warn that today, the U.S. does not have the communications equipment, navigation aids, or sufficient hardened-hull ships to respond to natural or man-made disasters in that fragile area or to protect our vital interests in the region. In other words, we are not prepared in the short term for the rate of increase in Arctic activity. We must invest today in increasing our capability and capacity.

### ***B. Growing awareness of climate risks and planning in the U.S.***

On the positive side, we have seen increased awareness of climate risks in communities around the U.S., and constructive planning underway in various regions. Two examples are worth noting.

#### ***Pacific Northwest provides a national model for action***

On June 4, 2014, I participated in a symposium in Seattle convened by the Henry M. Jackson Foundation and the U.S. Department of Energy’s Pacific Northwest National Laboratory on “National Security and Climate Change.” Bringing together local and national leaders and practitioners, this effort used the CNA Military Advisory Board’s recent report as a launching point to explore how to address climate security risks in the Pacific Northwest. The symposium report states:

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<sup>3</sup> National Research Council. Responding to Oil Spills in the U.S. Arctic Marine Environment. Washington, DC: The National Academies Press, 2014.

Many communities in the Pacific Northwest are serious about addressing climate change and national security threats. Climate scientists have reported that the Northwest region of the country will likely experience increasing wildfires from decreased snowpack, increasing storms leading to flooding, and rapid ocean acidification.

These changes pose numerous economic and safety challenges, such as alterations of salmon spawning patterns and increased risks of rockslides that threaten both infrastructure and human life. Furthermore, sea level rise also places critical infrastructure such as railroads and ports at risk due to their low elevation. Federal, state, and regional governments will be forced to deploy resources and manpower to respond.

Local governments are using these findings in future planning. For example, the bipartisan King County Council, which covers the greater Seattle region, called for the development of a strategic climate action plan. The groundbreaking plan provides a blueprint for carbon mitigation and adaptation that could be used as a national model for other localities.

Utilities in the region are also planning for impacts, including the ability to serve military bases.

### ***Hampton Roads, Virginia: Partnerships to manage sea level rise***

A second example is Hampton Roads, Virginia, where sea level rise is being jointly addressed by the military and the local community. (The CNA MAB report features Hampton Roads as a case study on page 25.) Rising sea levels, natural subsidence, and storms pose risks to the many military facilities, related commercial shipyards and suppliers, and the community in this critically important region. The area has hundreds of miles of waterfront from three major rivers that all flow into the Chesapeake Bay. DOD realizes that sea level rise will affect both the Hampton Roads installations and the surrounding civilian community. Working with other federal, state, and local agencies, and Old Dominion University, DOD has launched an aggressive effort to develop plans and measures to sustain the vital missions of this region and protect the large surrounding community.

### **III. INCREASING IMPACTS ON MILITARY READINESS**

The MAB finds that projected changes in climate will have three major impacts on the military: more demand, challenges to readiness, and new and harsher operating environments.

The MAB expects to see an increased demand for forces across the full spectrum of operations. Domestically, responses to extreme weather events and wildfires in the U.S. will increase demand for National Guard and reserves. The frequency, severity, and probability that these events could happen simultaneously will also likely increase demand for active duty forces to provide defense support of civil authorities (DSCA). This concerns us because, in a leaner military, many of our capabilities reside in the Guard and reserve, and if they are being used domestically, they are less available to respond to worldwide crises.

Globally, there will be increased demands for humanitarian response and disaster relief in response to extreme weather events. Witness more than 13,000 military troops who responded to Typhoon Haiyan in the Philippines late last year.

In addition to more demand, which in itself will stress readiness, our bases will be increasingly at risk. Our bases are vulnerable to sea level rise and extreme weather, including drought and, in the future, increased precipitation in the form of rain and snow. Drought and the threat of wildfires have already caused live fire training restrictions on major training ranges in Texas and Southern California and, earlier this year, a wildfire at Camp Pendleton shut down training and caused partial evacuation of the base. It is not just the bases that are vulnerable, but also the surrounding communities that house and support the military. If our sailors, soldiers, airmen, and marines can't get to their bases, because the roads are flooded, then we can't maintain the readiness of the force.

Finally, the impacts of climate change will cause the military to be deployed to harsher environments. Higher temperatures have and will continue to stress equipment and people.

#### **IV. NATIONAL POWER AFFECTED BY CLIMATE RISKS**

The final area I want to cover is how climate change will impact the elements of national power.

National security is more than just having a strong or capable military. America's security is determined by multiple elements of National Power: diplomacy, infrastructure, military, and economic assets, to name just a few. When deployed strategically, they can constitute "smart power." On the vulnerability side, National Power can also be assessed by degradations to these assets or systems.

#### **A. Strain on military readiness and base resilience**

As mentioned earlier, the projected impacts of climate change could be detrimental to military readiness; strain base resilience, both at home and abroad; and limit our ability to respond to future demands. More forces will be called on to respond in the wake of extreme weather events at home and abroad, limiting their ability to respond to other contingencies. Projected climate change will make training more difficult, while at the same time, will put at greater risk critical military logistics, transportation systems, and infrastructure—both on and off base.

As coastal regions become increasingly populated and developed, more frequent or severe storms increasingly will threaten vulnerable populations in these areas and increase the requirements for emergency responders. Simultaneous or widespread extreme weather events and/or wildfires, accompanied by mass evacuations, and degraded critical infrastructure could outstrip local and federal government resources, and require the increased use of military and private sector support.

#### **B. Risks to critical infrastructure**

The nation depends on critical infrastructure for economic prosperity, safety, and the essentials of everyday life. All 16 critical infrastructure sectors identified in the Department of Homeland Security planning directives will be impacted by our changing climate. We are already seeing how extreme heat is damaging the national transportation infrastructure such as roads, rail lines, and airport runways. Moreover, much of the nation's energy infrastructure—including oil and gas refineries, storage tanks, power plants, and electricity transmission lines—is located in coastal floodplains, where it is increasingly threatened by more intense storms, extreme

flooding, and rising sea levels. Projected increased temperatures and drought across much of the nation will strain energy systems (with more demand for cooling) and increase water stress. Since much of the critical infrastructure is owned or operated by the private sector, government and the private sector will need to work closely together to develop solutions to address the full range of these challenges.

### **C. Economic Risks.**

The MAB holds that a strong economy is critical to national security. In June of 2014, Hank Paulson, who served as Secretary of the Treasury under President George W. Bush, co-chaired a panel of business leaders and economic experts and published the report, “Risky Business: the Economic Risks of Climate Change in the United States.”

The report stated:

Our key findings underscore the reality that if we stay on our current emissions path, our climate risks will multiply and accumulate as the decades tick by. These risks include:

Large-scale losses of coastal property and infrastructure:

- Property losses from sea level rise are concentrated in specific regions of the U.S., especially on the Southeast and Atlantic coasts, where the rise is higher and the losses far greater than the national average.

Extreme heat across the nation—especially in the Southwest, Southeast, and Upper Midwest—threatening labor productivity, human health, and energy systems:

- By the middle of this century, the average American will likely see 27 to 50 days over 95°F each year—two to more than three times the average annual number of 95°F days we’ve seen over the past 30 years. By the end of this century, this number will likely reach 45 to 96 days over 95°F each year on average....
- Demand for electricity for air conditioning will surge in those parts of the country facing the most extreme temperature increases, straining regional generation and transmission capacity and driving up costs for consumers.

Shifting agricultural patterns and crop yields, with likely produce gains for Northern farmers offset by losses in the Midwest and South:

- As extreme heat spreads across the middle of the country by the end of the century, some states in the Southeast, lower Great Plains, and Midwest risk

up to a 50% to 70% loss in average annual crop yields (corn, soy, cotton, and wheat), absent agricultural adaptation....

- Food systems are resilient at a national and global level, and agricultural producers have proven themselves extremely able to adapt to changing climate conditions. These shifts, however, still carry risks for the individual farming communities most vulnerable to projected climatic changes.”<sup>4</sup>

## **CONCLUSION: THE TIME IS NOW**

In sum, projected climate change may cause increased instability around the world; we are not prepared for the pace of climate change as evidenced by our limited capability and capacity to respond to the opening of the Arctic; climate change will likely impact our military readiness and support systems as well as lead to increased demand for forces, both at home and abroad, and finally climate change will impact elements of our national power here at home. Let me leave you with these comments by the 16 Generals and Admirals who authored our most recent report:

At the end of the day, we validate the findings of our first report and find that in many cases the risks we identified are advancing noticeably faster than we anticipated. We also find the world becoming more complex in terms of the problems that plague its various regions. Yet thinking about climate change as just a regional problem or—worse yet—someone else’s problem may limit the ability to fully understand its consequences and cascading effects. We see more clearly now that while projected climate change should serve as catalyst for change and cooperation, it can also be a catalyst for conflict.

We are dismayed that discussions of climate change have become so polarizing and have receded from the arena of informed public discourse and debate. Political posturing and budgetary woes cannot be allowed to inhibit discussion and debate over what so many believe to be a salient national security concern for our nation.<sup>5</sup>

In their foreword to the CNA MAB report, former Secretary of Homeland Security Michael Chertoff and former Secretary of Defense Leon Panetta summarized our most important

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<sup>4</sup> “Risky Business; the Economic Risks of Climate Change in the United States.” Retrieved on 25 July, 2014 from <http://riskybusiness.org/report/overview/executive-summary>

<sup>5</sup> CNA Military Advisory Board, *National Security and the Accelerating Risks of Climate Change* (Alexandria, VA: CNA Corporation, May 2014), p. iii.

message for the Committee: “The update serves as a bipartisan call to action. It makes a compelling case that climate change is no longer a future threat—it is taking place now. . . . [A]ctions to build resilience against the projected impacts of climate change are required today. We no longer have the option to wait and see.”<sup>6</sup>

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<sup>6</sup> *Ibid.*, p. i.