

**Remarks by  
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**RISING TO THE CHALLENGE OF EXTREME EVENTS**

**I. INTRODUCTION / A THREAT TO OUR PRESENT AND OUR FUTURE**

Thank you to Peter Saundry, the NCSE team that assembled this terrific gathering.

This morning I'd like to share my thoughts with you about rising to the challenge of extreme events, and I don't mean election year politics! I mean the increasing number of national disasters, weather extremes, and related phenomenon that we have been experiencing. Sometimes we ask, “How will extreme events shape our future?” or “How will these shocks and trends affect America's national security in 10 years, 20 years, or 30 years?”

But everyone in this room understands that is not enough, because extreme events, and the causes underlying them, are not just a threat to America's future.

They are very much a threat to our present—to our national security right now. We need to manage these risks today and prepare for a different future, a future more filled with extremes.

**II. THESE CHALLENGES ARE RELATED**

What is so exciting about this conference is that we have people here from so many disciplines, who recognize that the challenges of water, food, energy, climate change, and human health are not problems that we can shoe-horn into different stovepipes or approach as isolated problems. I could not have imagined, even 10 years ago, let alone 20 years ago, when the field of environmental security was just beginning, that a conference as diverse and content-rich as this one could occur.

These challenges are all related—and together, they present what I believe is the most serious challenge the world faces today: which is, can we can work together to find ways to get ahead of—or even reverse—the impact of extreme events while we still have a chance?

While I know that most of us will go into break-out sessions associated with the fields in which we are focused—I would offer from the start that the real benefit of having such a

comprehensive conference is seeing how others are approaching challenges that are directly or tangentially related to those that brought you here today. This is the intellectual capital for your next venture, whether in academia, policy, or business.

While there is fascinating work happening around each challenge today—the real potential lies in finding solutions at the intersections of each challenge. In DoD, we recognize this as the synergy that comes from “joint operations” and it is the only way the military conducts operations today.

What I hope to share with you today are some of the ways that these challenges are connected—and then talk briefly about how we can work together to find solutions.

While this conference is focused on five broad categories, given our limited time this morning, I’m only going to talk about three. They are the three that keep me up at night most often now that my kids no longer do: energy, climate change, and water.

### **III. MY ROAD TO THIS PODIUM**

When I started in this field—more years ago than I’d care to admit—many of us believed that the only real threat we faced was the threat of nuclear annihilation, a “bolt out of the blue” nuclear attack by the Soviet Union. History remembers that time as the Cold War. I never thought I’d come to think of it as “the good old days.”

I didn’t want to bring my children into a world where mutually assured destruction and nuclear fallout shelters were a way of life. So I began my career in nuclear weapons and arms control. As we made progress and the world started to get rid of nuclear warheads, I watched as the Soviets dumped decommissioned submarine nuclear reactors into the ocean.

That was just great: save the world from nuclear war, but risk the oceans with radioactive and hazardous contamination. It became increasingly clear to me the impact humans have on this fragile ecosystem in which we live. So, I shifted my focus to environment and security.

Over time, the focus on environmental issues evolved, and became part of our National Security Strategy. 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 prevent transnational environmental crime (such as overfishing and illegal logging and ocean dumping).

In the 1990s, this led the DoD to begin integrating environmental concepts into planning under its Preventive Defense Strategy, and to take on the role of “...[helping] deter or mitigate the impacts of adverse environmental actions leading to international instability.” That was my focus as Deputy Under Secretary during the Clinton Administration.

There were those who wondered at the time why we did it. After the year we just had, 2011—let alone the decade we just had—there aren’t as many who question it anymore.

Context is vital. Any discussion of extreme events—and both the present and future dangers they pose—must begin by putting those events in context against two inescapable truths.

#### **IV. TWO TRUTHS: POPULATION AND TECHNOLOGY**

The first truth is that population growth is exploding. Last fall, the earth passed seven billion people for the first time—and half of which were added in the past 40 years. Between three and four billion will be added this century. Here's an astonishing fact: one million people every five days will move to an urban area between now and 2030. There will be more cities built the next 50 years than in all of history combined. Just imagine what that will mean for food, water, sanitation, housing, pollution, and disease.

The second truth is that technology and human innovation will enable even more rapid advances. We can already map human DNA, grow body parts in petri dishes, conduct engineering at an atomic scale, and build machines that function at a cellular level. Our ability to bio engineer plants has allowed us to revolutionize agriculture. Just think how routine it now is to press a few keys on your computer and Skype—in seconds—with another person half a world away. By 2025, we will have developed the processing power of the human brain in a computer smaller than a laptop. Social media will continue to transform relationships on every level. These advances in technology give me great reason to be optimistic.

#### **V. DEMAND FOR ENERGY IS ACCELERATING**

Yet, these technology improvements and population increases have come with a huge price. And that price is energy.

Over the last 100 years, advances in technology have caused the world demand for energy to increase dramatically.

As most of you know, the world is primarily a carbon based energy system. We draw a small percentage from Hydro, nuclear and other renewables, but the vast majority of our energy comes from fossil fuels and in poorer areas of the world, charcoal and wood. Over the last 40 years, the per capita energy consumption has averaged the equivalent of about 1.5 tons of oil per person per year. As industrialization has progressed, the amount of per capita energy used has also increased, rising 50 percent in just the last 40 years.

As two billion people in the developing world have joined the global economy in the past two decades, demand has increased dramatically. And it's only just begun.

The International Energy Agency has modeled energy use over the next four decades, as the population grows and countries like China and India modernize.

Assuming there are no new energy or climate policies that are put in place, they have found that primary energy usage will increase 84 percent; oil demand will rise 70 percent; and carbon emissions will leap a whopping 130 percent. And in the United States—which already imports nearly 10 million barrels of oil *every single day*—the price of petroleum is expected to more than triple in the next 25 years while the U.S. competes with other nations for scarce resources.

As much as we all hope renewable energy—like wind, solar, and biofuels—will save us: today, just three percent of power around the world is generated from renewable energy, and—at current projections—that number is expected to rise to only 17 percent by 2030.

As we all know, critically important parts of the world where energy deposits are the largest and most available are the same parts that breed volatility and uncertainty—which is one of the reasons why my colleagues on the CNA Military Advisory Board have recognized our over-reliance on this single form of energy is a national security threat. It reduces our leverage with hostile countries while compromising us militarily, diplomatically, and economically.

Which brings me to Iran. The high-stakes showdown between the U.S. and Iran right now over the Strait of Hormuz is just the most recent example of the dangerous global politics of oil. In response to evidence that suggests Iran is building a nuclear weapon, the U.S. has imposed sanctions, and threatened to choke Iran's oil exports.

Iran has responded by threatening to close the Strait of Hormuz: through which 16 million barrels—about a fifth of the world's daily oil trade—passes every day. Closing it would cut off half of the supply of oil to the United Kingdom, and likely double the price of a barrel of oil, which would harm large sectors of our economy.

The Secretary of Defense responded immediately, saying that if Iran closes the Strait, it would draw an American response. The Chairman of the Joint Chiefs followed up, saying that the United States would “take action and reopen the strait,” which could be accomplished only by military means, including minesweepers, warship escorts, and potentially airstrikes.

It's not clear now how this will end. But one thing is clear: America must reduce its oil dependence by accelerating development of clean energy alternatives, and making environmentally sound use of our own domestic energy sources, especially new-found, so-called unconventional gas reserves.

## **VI. CLIMATE CHANGE IS PRODUCING RECORD EXTREME EVENTS**

Which brings us to climate change.

This is the only major city in the world where the jury is still out on climate change. The rest of the world made up its mind more than a decade ago: that our use of carbon-based

fuels over the last century is the single greatest contributor to having levels of carbon in the atmosphere that far exceed historical cyclic variations.

In fact, concentrations of greenhouse gases in our atmosphere are the highest the earth has seen in 15 million years. We know what's happening: these gases trap heat in the atmosphere, which warms both the oceans and the air. Warmer oceans give off moisture, and a warmer atmosphere can hang on to that moisture longer. Of course, more moisture in the air leads to more powerful storms. The more moisture in the air, the more powerful storms tend to grow. When these more powerful storm systems hit land, they don't just produce excess rain or snow—they become cyclones, blizzards, and floods.

Exhibit A in that description is the year we just lived through. After 2010 brought both Snowmageddon and the hottest year ever recorded, it was hard to imagine what 2011 might do for an encore. As it turns out, it broke even more records.

Since we began keeping records, the U.S. has averaged about three extreme weather events per year: with damage greater than \$1 billion. In 2008, we set a new record with nine. In 2011, we shattered that record with 12.

The year started with record blizzards that buried 22 states. In South Bend, Indiana, a record 26 inches of snow fell in one day.

Then came the deadliest tornado season we've ever seen, even though that is not climate driven. The previous record for most tornadoes in a single month was 542—set in 2003. In April, we shattered that record with 747. In just six weeks, 550 people were killed, causing \$25 billion in damage. Then, in May, another tornado with winds topping 200 miles an hour leveled Joplin, Missouri.

That gave way to record rainfall that caused both the Mississippi and Missouri Rivers to flood. In August, Hurricane Irene drenched the Eastern seaboard, causing more than \$7 billion in damage. Meanwhile, Texas suffered through its worst one-year drought ever, as crop losses reached \$10 billion. Arizona had the largest wildfires in its history, burning 538,000 acres.

Across the nation, more than 6,000 heat records were broken in 2011. And around the world, we saw many weather extremes and natural disasters.

Japan had a devastating tsunami. Australia, Thailand, China, Pakistan, and the Philippines were hit with record flooding. Turkey, Burma, New Zealand, and Virginia were all hit with earthquakes. The Horn of Africa suffered its worst drought in decades.

Meanwhile, Arctic sea ice melted to a level not recorded since satellite observations started in 1972 – and almost certainly not experienced for at least 8,000 years, polar scientists say.

As the year came to a close, the United Nations Intergovernmental Panel on Climate Change confirmed what almost all of us suspect: that much of the extreme weather we saw

in 2011 was caused by human-induced climate change and concluded that it will only get worse in coming decades.

But it only takes one disaster to lead to a calamity. We all know about Hurricane Katrina—but in 2011, Pakistan had its worst floods in 80 years. More than 4,000 died, 11 million were left homeless, and 20 million more were affected. Food production has still not returned to capacity. All it takes is one accident in nuclear-armed, Taliban-infested Pakistan for the entire region to be destabilized: and that's true of many nations.

Last year the Defense Science Board, through a Task Force on which I was honored to serve, released an important report. It found that climate change has the potential for significant impacts on all three of the basic elements important to national and international security: defense, diplomacy, and economics. It also warns of increasing challenges to national security caused by climate change. Among our important recommendations is that national security decision makers incorporate planning assumptions of a several degree rise in global temperatures by the end of the century.

For all of us who believe that man-made climate change is responsible for these historic changes, who believe that we can't wait until we're 100 percent certain to act, now is the time to stand up and be counted.

## **VII. FUTURE WARS WILL BE FOUGHT OVER WATER**

Between the increasing challenges of climate change, and the increasing demands of rapid population growth, the one area that's already being heavily affected is water. That's the third interconnected point I'd like to discuss.

Even though our planet is covered by water, more than 97 percent of it is salt water. Another two percent of it is locked up in glaciers and snowcaps. That means that the remaining one percent is needed for everything else: from drinking to bathing to growing our crops to cooling our power plants.

As the world passes seven billion people, the challenge of clean drinking water is already one of the globe's leading development issues. As many as 900 million people have no access to clean drinking water today, 46 percent of the people on the planet do not have access to water in their homes—and another 2.5 billion people have no way to properly dispose of human waste.

In countries like Tanzania and Somalia, the average amount of water used per person equals the amount the average person in a developed country uses to brush their teeth just once with the tap running. In Ethiopia, women have been known to get up as early as 4:00 in the morning, spending five or six hours a day walking long distances, carrying 50 pounds of water on their backs.

In India, the World Bank has estimated that the per capita availability of water has decreased by 20 percent in the past 20 years. More than a billion people in India depend

on the aquifer for their drinking water—which is down to about 300 feet today. At 400 feet, it becomes salt water. If nothing is done to reverse it, it will be a humanitarian crisis the likes of which we've never seen before.

It's not just India. Two-thirds of the world's population will not have enough water by 2025 if current trends aren't reversed. And remember—this is *before* the planet adds another three or four billion people.

Now, add the interconnectedness of climate and changing weather patterns, which are expected to have more dry days and less average precipitation for much of the world—and we can see how and why many countries important to the U.S. will experience water problems that could portend instability and state failure, reduce food production in key regions, and dampen economic growth.

Adm. Mullen, the former Chairman of the Joint Chiefs, tied these matters together in remarks not long ago. He said:

*Near the polar cap, waterways are opening that we could not have imagined a few years ago, rewriting the geopolitical map of the world. Rising sea levels could lead to mass migrations, similar to what we have seen in Pakistan's recent flooding. Climate shifts could drastically reduce the arable land needed to feed a burgeoning population as we have seen in parts of Africa. As glaciers melt and shrink at a faster rate, crucial water supplies may diminish further in parts of Asia. This impending scarcity of resources compounded by an influx of refugees if coastal lands disappear not only could produce a humanitarian crisis, but also could generate conditions that could lead to failed states and make populations more vulnerable to radicalization. These troubling challenges highlight the systemic implications – and multiple order effects – inherent in energy security and climate change.*

That's not an environmental activist talking that was our nation's senior military leader.

In the Middle East alone, disputes over water are one of the underlying tensions between Israel and its neighbors. Last year, in northern Syria, more than 160 villages had run dry and been deserted by residents. In Lebanon, 70 percent of wastewater was dumped into cesspools, polluting groundwater. Jordan struggled through just 10 percent of its average rainfall.

Meanwhile, the World Bank estimates that per capita water availability in the region will fall by 50 percent by 2050. Because of the interconnected nature of these challenges, extreme events are having second and third order consequences to human systems as well as natural systems. What happens when the population explodes, as it's expected to during that same period of time?

There are actually some leading diplomats today across the region who believe that water might be the starting point for peace discussions, since the clear and present danger of water scarcity is so stark.

As some of you here know well, the science of turning salt water into clean drinking water is progressing. While it is widely practiced in Israel and Arabian Gulf states, desalination costs three times what it costs to produce water from traditional supplies, and can take ten times the energy. No nation alone is going to solve this—and yet, water’s potential to act as a destabilizing element or a threat multiplier is profound.

## **VIII. I’M AN OPTIMIST**

These are great challenges—but I come here today as an optimist, not a pessimist.

I come back to the place where I began: even though we are living in a world of extremes, with much more on the horizon—just like in the Cold War—I believe we can walk back from this brink.

I have seen how people and organizations, dedicated to the long haul, can build the necessary resilience to not only survive challenging times, but to thrive.

If my time working with DoD has shown me nothing else, it has instilled in me that no single group can tackle wicked problems alone and that dedicated effort across disciplines can build unmatched capability and resilience. I have seen how the individual services have their own strengths—but when they come together in joint operations, the combined strength is manifest by the resilience to overcome any weakness or miscalculations of any other part.

Far too often we see these challenges addressed in stove pipes, or worked as single problems. But as this conference has made clear: we don’t have the luxury of working these challenges in isolation. They are all related.

If you take nothing else away from this conference I hope that you take a iPhone full of cards of those working issues in fields that are related and unrelated to yours—and that you work to find ways of working together at the intersection of these challenges. The field of environmental security has grown in recent years by just such methods.

## **IX. WHAT WE CAN DO TOGETHER**

Collectively, here’s what I think we can do.

First, I draw on my colleagues and reinforce the recommendation of the CNA Military Advisory Board that the national security consequences of energy, water, and climate change should continue to be integrated into national security and defense strategies.

Second, that the U.S. should not only take a leadership role in trying to stabilize the global climate, but commit to global partnerships that will help less developed nations build the capacity and resiliency to better manage climate impacts.

Third, the United States should take a leadership role and boldly and aggressively support clean energy technology innovation and rapidly decrease the nation's dependence on fossil fuels. With just a 30 percent reduction in our reliance on oil, the U.S. could avert the crippling effects on our economy of the possible closure of the Straits of Hormuz, should Iran attempt such a move.

Fourth, we can use the model of military test beds and communities to test new technologies and approaches for energy, water, sustainability, and resilience. DoD has already initiated an innovative program that uses military installations as test beds to demonstrate new energy technologies from smart grids to better buildings. It can expand that model of test beds to partner with the local communities on approaches to improve resilience to extreme events, sustainability for water and conservation, and more.

Finally, for everyone here today, I hope we all recognize that these challenges will take a whole of government and whole of society approach to address. While deep expertise in a subject matter is important, so is the ability to integrate across many disciplines and types of organizations. Sometimes we are stymied in addressing a problem because the solution isn't in the lane of our organization.

We have to move beyond these bureaucratic stovepipes and use increasingly limited resources in more creative ways. Each of us should get out of our comfort zones and be open to embracing new ways of working together. Only by adopting a comprehensive approach will we be able to solve the energy, climate, water, food, and health security challenges of the future.

## **X. CONCLUSION / ARCTIC SHIP**

Let me leave you with this image. Recently, I had the pleasure of meeting the crew that participated in the first successful single season circumnavigation of the Arctic. Of course, the only reason it was possible was because of the receding ice cap caused by the warming of the earth. But here's the fascinating part. The captain was from Norway. The trip was financed by a Sheik from Dubai. The other crew members were from around the world, including France, Canada, and Russia. They spent 66 days together on a 32 foot sailboat.

If we are going to get ahead of these issues in our lifetime, it will take exactly that kind of unexpected collaboration—not only across sectors, but across nations, across continents, and across generations. Together I hope we can inspire great young minds to take up this challenge with us and more carefully steer and steward our planet. That is exactly the spirit in which we all meet here this week. Thank you.