

GLOBAL WARMING: ITS IMPLICATIONS FOR U.S. NATIONAL SECURITY POLICY

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USAWC STRATEGY RESEARCH PROJECT

**GLOBAL WARMING: ITS IMPLICATIONS FOR
U.S. NATIONAL SECURITY POLICY**

by

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ABSTRACT

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GLOBAL WARMING: ITS IMPLICATIONS FOR U.S. NATIONAL SECURITY POLICY

That man-made carbon dioxide has a net planetary warming effect is an important hypothesis, one that science can make stronger or weaker, but can't prove. It may be true, but a layperson only has to look into the antecedents of today's "consensus" to realize it wouldn't be too surprising if tomorrow's consensus were that CO₂ is cooling, or neutral, or warming here and cooling there.

—Holman W. Jenkins, Jr.¹

What is global warming, and what is causing it? What affect is global warming having on the planet, and how will that impact man? What are the implications for U.S. national security policy and diplomacy? This paper will address these questions. It will conclude with proposed recommendations for U.S. leaders and policy makers to consider in addressing the security interests of the future.

Anthropogenic Global Warming?

Although many scientists and policy makers claim that there is a consensus about anthropogenic global warming, one must be careful not to confuse consensus with unanimity. There are thousands of scientists studying the global climate change. Many of them believe that man is responsible for causing global warming due to the introduction of anthropogenic greenhouse gases. The key anthropogenic greenhouse gases (i.e., carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and tropospheric ozone (O₃)) reached record levels in the 1990's due to the combustion of fossil fuels, agriculture, and land-use changes.² Nevertheless, there remain a large number of equally prominent scientists who, although they may agree with some of the findings, do not believe that man can be blamed for the earth warming. Much of the disagreement between the two camps is a result of differences between science and policy.

Thirty years ago the international community began to seriously consider the implications of man's affect on the climate. It was through organizations such as the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) that this collective work began to gain widespread acceptance. These organizations began to lead a consolidated effort to assess climate change. This gave the scientific community a forum through which they could share their research in the hopes of developing a common understanding.

In 1979, the WMO held the first World Climate Conference. Here they expressed concern that "continued expansion of man's activities on earth may cause significant extended regional and even global changes of climate."³ Because of this concern, they sought cooperation to examine global climate change and its impact on man. It was through this cooperation that they were able to garner greater support for further research into anthropogenic climate change.

In 1985, the WMO met with the UNEP and the International Council for Science (ICSU) to assess the role and impact of carbon dioxide and other greenhouse gases in climate change. They concluded that greenhouse gases could cause the earth's mean temperature to rise to the highest levels in recorded history.⁴ Because of this unprecedented warming, they determined that past climate data was unreliable. They also saw linkage with other environmental issues such as rising sea levels. These observed and anticipated changes led the WMO, UNEP, and ICSU to establish an Advisory Group on Greenhouse Gases. This group would assess, "the state of scientific knowledge on climate change and its implications."⁵

Intergovernmental Panel on Climate Change (IPCC)

Soon thereafter, the WMO and UNEP reached an agreement on establishing an intergovernmental organization to assess climate change. It was this agreement that led to the formulation of the IPCC because the WMO and UNEP saw a need for policy makers to have “an objective source of information about the causes of climate change, its potential environmental and socio-economic consequences, and the adaptation and mitigation options to respond to it.”⁶ As an intergovernmental agency, the IPCC sees itself as a “policy-relevant but policy neutral”⁷ organization, able to inform without an agenda or bias. It consists of three working groups. “The IPCC Working Group I assesses the physical scientific aspects of the climate system and climate change.”⁸ The IPCC Working Group II assesses the vulnerability of socio-economic and natural systems to climate change, negative and positive consequences of climate change, and options for adapting to it.⁹ The IPCC Working Group III assesses options for mitigating climate change through limiting or preventing greenhouse gas emissions and enhancing activities that remove them from the atmosphere.”¹⁰ It is between these three groups where neutrality and bias are sometimes in conflict as the Panel advocates for a particular course of action.

By design, the IPCC’s work should meet the highest standards of science and technology and reflect a broad range of credible scientific views on global climate change.¹¹ By mandate, its “role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation.”¹² It then

takes these assessments and regularly reports on its findings. These reports have then been used to negotiate support positions.

Kyoto Protocol

Thus far the IPCC's reports have greatly influenced policy makers' decisions. Supporters of the IPCC routinely cite IPCC reports as the definitive body of evidence in support of anthropogenic climate change. The first report in 1990 was the basis for the United Nations Framework Convention on Climate Change (UNFCCC). This established a framework for climate change policy. The second report in 1995 was crucial to negotiating the Kyoto Protocol in 1997. Subsequent reports have continued to provide further evidence and analysis supporting both the UNFCCC and the Kyoto Protocol.¹³ The Kyoto Protocol is a pact among 185 governments whereby the developed countries agree to reduce their overall emissions of anthropogenic carbon dioxide and other greenhouse gases "by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012."¹⁴

In the *Climate Change 2001: Synthesis Report*, the IPCC reports that "the earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era, with some of these changes attributable to human activities."¹⁵ It goes on to explain that these human activities have led to the increase in atmospheric concentrations of greenhouse gases. In the U.S., burning fossil fuels to generate electricity and burning gasoline to operate automobiles are the largest contributors of greenhouse gas emissions in the atmosphere.

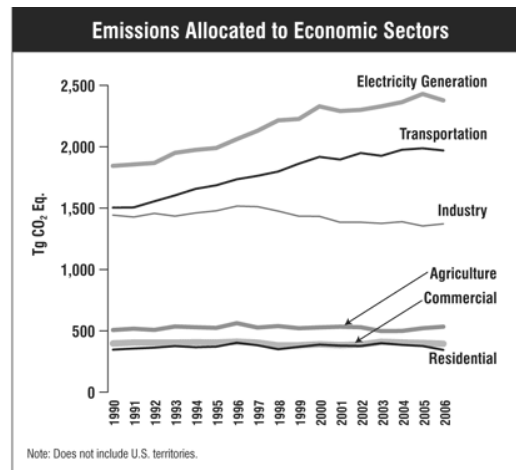


Figure 1. U.S. Greenhouse Gas Inventory - Emissions Allocated to Economic Sectors¹⁶

More recently, the IPCC's *Climate Change 2007: Synthesis Report* makes even more definitive statements regarding anthropogenic causes for change. "There is *very high confidence* that the net effect of human activities since 1750 has been one of warming."¹⁷ The body of evidence reported by the IPCC to support this theory appears quite compelling to policy makers. Nevertheless, there are dissenting opinions.

Flawed Science?

Despite the scientific "evidence" reported by the IPCC, many prominent scientists, some of whom contributed to the IPCC work; do not concur with the conclusions drawn by those who support the theory of anthropogenic global warming. Any serious look at this issue would be remiss if it did not give a voice to those dissenters. Below is what three of those distinguished scientists have said.

Dr. Richard Lindzen, Ph.D., the Alfred P. Sloan Professor of Meteorology at the Massachusetts Institute of Technology, wrote in a 2006 Wall Street Journal article,

Most of the climate community has agreed since 1988 that global mean temperatures have increased on the order of one degree Fahrenheit over the past century, having risen significantly from about 1919 to 1940,

decreased between 1940 and the early '70s, increased again until the '90s, and remaining essentially flat since 1998.

There is also little disagreement that levels of carbon dioxide in the atmosphere have risen from about 280 ppmv (parts per million by volume) in the 19th century to about 387 ppmv today. Finally, there has been no question whatsoever that carbon dioxide is an infrared absorber (i.e., a greenhouse gas — albeit a minor one), and its increase should theoretically contribute to warming. Indeed, if all else were kept equal, the increase in carbon dioxide should have led to somewhat more warming than has been observed.

The models imply that greenhouse warming should impact atmospheric temperatures more than surface temperatures, and yet satellite data showed no warming in the atmosphere since 1979. The report showed that selective corrections to the atmospheric data could lead to some warming, thus reducing the conflict between observations and models descriptions of what greenhouse warming should look like. That, to me, means the case is still very much open.¹⁸

Lindzen's point is clear. Although scientists agree on many aspects of the study of global warming, there is simply no conclusive evidence to attribute global warming to man. It should be noted that Dr. Lindzen, besides being a distinguished scientist in meteorology,¹⁹ was a member of the IPCC and a lead author for a portion of the 2001 Climate Change Assessment Report, Physical Climate Change Processes and Feedback.²⁰

Dr. John R. Christy, Ph.D., the Distinguished Professor of Atmospheric Science and Director of the Earth System Science Center at the University of Alabama in Huntsville, wrote in a 2007 Wall Street Journal article,

I'm sure the majority (but not all) of my IPCC colleagues cringe when I say this, but I see neither the developing catastrophe nor the smoking gun proving that human activity is to blame for most of the warming we see. Rather, I see a reliance on climate models (useful but never "proof") and the coincidence that changes in carbon dioxide and global temperatures have loose similarity over time.

There are some of us who remain so humbled by the task of measuring and understanding the extraordinarily complex climate system that we are

skeptical of our ability to know what it is doing and why. As we build climate data sets from scratch and look into the guts of the climate system, however, we don't find the alarmist theory matching observations.²¹

Just like Lindzen, Christy is an award winning, distinguished climate scientist,²² and was a contributing author for the IPCC Fourth Assessment Report, Working Group I "The Physical Science Basis."²³

And then there is Dr. Roy Spencer, Ph.D., who "received his Ph.D. in meteorology at the University of Wisconsin-Madison in 1981. Before becoming a Principal Research Scientist at the University of Alabama in Huntsville in 2001, he was a Senior Scientist for Climate Studies at NASA's Marshall Space Flight Center, where he and Dr. John Christy received NASA's Exceptional Scientific Achievement Medal for their global temperature monitoring work with satellites."²⁴ Spencer testified to the Senate Environment and Public Works Committee on 22 July 2008:

Despite decades of persistent uncertainty over how sensitive the climate system is to increasing concentrations of carbon dioxide from the burning of fossil fuels, we now have new satellite evidence which strongly suggests that the climate system is much less sensitive than is claimed by the U.N.'s Intergovernmental Panel on Climate Change (IPCC).

...it must be mentioned that new research contradicting the latest IPCC report is entirely consistent with the normal course of scientific progress. I predict that in the coming years, there will be a growing realization among the global warming research community that most of the climate change we have observed is natural, and that mankind's role is relatively minor.²⁵

In his testimony, Spencer did not challenge the opposing view about global warming with rhetoric or hostile language. Rather, he presented new scientific evidence open to examination by his peers. This evidence suggests that global warming is not caused by anthropogenic greenhouse gases.

There are some common themes among these three scientists. Each agrees that there is no conclusive evidence of anthropogenic global warming. Each is expert in their fields of climate science, eminently qualified to speak on the subject of global warming. And each has approached this issue from a scientific standpoint. This stands in contrast to many, on both sides of the debate, who resort to tactics of fear or intimidation to win their argument.

Indeed, global climate change has been a concern of scientists throughout the twentieth century. And only recently has a consensus developed among many in the scientific community about anthropogenic global warming. But scientists' predictions about global warming and cooling have repeatedly changed for over a century. Some of those climate change predictions were chronicled in the 2009 article, "Is Global Warming on the Wane?"²⁶ The article revealed how challenging it has been for the scientific community to accurately predict the nature of climate change. In 1912, the *Los Angeles Times* proclaimed, "The human race will have to fight for its existence against cold."²⁷ That same year, *The New York Times* warned, "An ice age is encroaching."²⁸ By 1939, *TIME* was reporting, "...weathermen have no doubt that the world, at least for the time being, is growing warmer."²⁹ Thirty-one years later, *TIME* was reporting on "the coming ice age."³⁰

The simple lesson to be taken away from these examples is that belief in anthropogenic global warming must be approached objectively and pragmatically. Regardless of whether one believes that man is causing global warming, or one believes that it is a natural occurrence, global warming has clearly become a significant

international issue that the U.S. must deal with. As a world power, U.S. climate change policy is likely to have far-reaching domestic and national security implications.

National Security Implications

Now that we have some background on the debate that exists about the causes for global warming, it is important to address what the implications will be for U.S. national security—regardless of the cause. This begins with an understanding of what constitutes a national security issue. Then it is necessary to determine what events are likely to occur due to climate change. Finally one must assess the possible courses of action the U.S. would most likely employ in response to those events.

In their analysis of the effects of climate change on U.S. national security, the Office of the Director of National Intelligence (DNI) used a broad definition for national security, which this paper will employ. The DNI “first considered if the effects would directly impact the U.S. homeland, a U.S. economic partner, or a U.S. Ally. (They) also focused on the potential for humanitarian disaster, such that the response would consume U.S. resources. (They) then considered if the result would degrade or enhance one of the elements of national power (Geopolitical, Military, Economic, or Social Cohesion), and if the degradation or enhancement, even if temporary, would be significant.”³¹ With this broad definition in mind, it becomes clear that climate change is likely to have a number of national security impacts that must be considered by U.S. policy makers.

In testimony to the House of Representatives Permanent Select Committee on Intelligence and Select Committee on Energy Independence and Global Warming, Dr. Thomas Fingar, Deputy Director of National Intelligence for Analysis and Chairman of

the National Intelligence Council testified that, “the most significant impact for the U.S. will be indirect and result from climate-driven effects on many other countries and their potential to seriously affect U.S. national security interests.”³² As testified to by the Deputy DNI, these impacts are likely to affect water and food supplies, health issues, and property among other things. Water, agriculture, extreme weather, competition for resources, and property impacts are just some of the areas where global warming intersects with national security issues. These negative impacts will be discussed below.

Water Shortages

The impact of global warming on water supplies is a very real possibility. Although water covers approximately 70% of the earth's surface,³³ it is access to water suitable for drinking and farming that is of the greatest concern. Many parts of the world are seeing glacial melting, snow cap melting, and desertification of previously arable land. The resulting affects will be, in some cases, a struggle for survival, competition for access, and potential unrest.

One such example of this can be seen in Iraq where the Tigris and Euphrates rivers provide the vast majority of water for farming and human consumption. The headwaters of the Euphrates and Tigris both originate in Turkey where the Turkish government has constructed one of the world's largest hydro-development programs.³⁴ Although there is disagreement between Iraq and Turkey about sharing this water resource and how much water should be allowed to flow into Iraq, neither country has yet contemplated violence to settle the dispute. Nevertheless, as global climate change

continues, reduced rainfall and further desertification threatens Iraq's main water source, the potential for tensions to escalate is easily recognized.

In another example, a Scripps Institution led study on the affects of global warming on water supplies; researchers found that shrinking glaciers in the U.S., Canada, Europe, Asia and South America will impact water resources across those geographies.³⁵ What that study found was that a warming effect would cause precipitation to fall as rain rather than snow. Because the rain would run off immediately, reservoirs would fill to capacity more quickly. Also, less snowfall would mean less runoff would be available in the spring. This has the effect of changing the natural cycle of refilling reservoirs.³⁶ Ultimately this results in less water available because the glaciers act as a natural replenisher for reservoirs during the summer when less precipitation falls, and when demand is up due to agricultural use.

Although this Scripps' study reflects bad news for the U.S. and Europe, it is particularly dire for Asia and South America. Unlike the U.S. and Europe where population growth is much slower, Asia and South America will face increasing demands for water due to population growth. Additionally, Asia and South America are likely to have less capacity to deal with this problem from a resource standpoint.

As the DNI pointed out in testimony to the Congress, these regional impacts are likely to pose national security risks to the U.S. due to water stress brought on by population growth and climate change.³⁷

Agriculture

There is a direct correlation between the impact of climate change on water supplies and its impact on agriculture and food supplies. As water suitable for farming

becomes scarcer there will be a resulting reduction in food production. This will not only impact the growing of cereal crops, fruits, and legumes, but will adversely affect raising livestock as well. Livestock not only compete for water, they also have the unintended consequence of leading to desertification in arid regions of the world.³⁸ A reduced capacity to produce food is a grave concern because the countries with the greatest population growth are also the least capable of dealing with the resulting shortages.

If you eat rice, like most of the world population does, then this next example may strike a chord with you. By early 2008, after six years of drought, Australia's rice industry had been reduced by 98%. This caused the closure of rice mills and spurred hoarding by the largest consumers of rice. In many countries violent protests erupted over short supplies.³⁹ Even in the U.S., many stores restricted how much rice customers could purchase at one time.

Scientists expect events such as this to get worse in the coming decades. The IPCC reports that even slight increases in global warming will negatively impact agriculture production in tropical and sub-tropical regions. At the same time, slight warming may have a beneficial effect on agriculture production in more temperate regions, particularly as one gets further from the equator. However, this would have the effect of raising food prices due to transportation costs.⁴⁰

The impact of global warming and climate change on agriculture and world food supplies is a U.S. national security risk for many of the same reasons as water shortages. However, the impact on agriculture has the potential for an even more pernicious effect because many developing countries rely upon agriculture for a large percentage of their economies. Unlike the developed world, these countries are less

likely to have the capacity to deal with the consequences of this agricultural devastation.⁴¹

Extreme Weather and Property Impacts

Many scientists have concluded that global warming may be contributing to an increase in extreme weather events. Extreme weather has the potential to affect millions of people globally. These events come in the form of stronger and potentially more frequent storms. Already there has been an increase in the frequency of category 4 and 5 hurricanes globally in the past quarter century.⁴² Category 4 and 5 hurricanes are characterized by winds in excess of 131 mph and 155 mph respectively. In addition to more powerful hurricanes, the IPCC has predicted an increase in heavy precipitation events as a result of global warming.⁴³ The price of increased extreme weather is not merely economic. There is a human toll to be paid as well.

According to National Oceanic and Atmospheric Administration's Climate Prediction Center in reporting on the 2008 hurricane season: "For the first time on record, six consecutive tropical cyclones...made landfall on the U.S. mainland and a record three major hurricanes...struck Cuba. This is also the first Atlantic season to have a major hurricane (Category 3) form in five consecutive months [July-November]."⁴⁴

In June 2008, a large part of the Midwestern U.S. received extremely heavy precipitation as multiple storm systems hit the region. Widespread flooding occurred as a result of more than a foot of rain hitting parts of Illinois, Indiana, Iowa, and Wisconsin during this storm. The result was large scale damage and devastation as levees and dams failed. In some cases river crests exceeded 500-year highs. By mid-June, the

storms were to blame for 24 deaths, 148 people injured, and more than \$1.5 billion in damage in Iowa alone.⁴⁵

As a national security issue, increases in extreme weather events will require that the U.S. respond with multiple elements of U.S. power: most often economic, military, and diplomatic. When catastrophe strikes abroad, the U.S. military is often one of the first and/or most capable to respond as it was following the 2004 Asian Tsunami. In order for the U.S. military to respond overseas, the U.S. must also exercise diplomacy through the Department of State. This was never more evident than when the U.S. had to negotiate to provide aid to Burma following the 2008 typhoon that killed tens of thousands of people.⁴⁶ Even the Department of the Treasury had to get involved to lift restrictions on money transfers to Burma.⁴⁷

In many cases, extreme weather will result in property impacts as discussed here. Consider, for example, the devastating impact to property when Hurricane Katrina hit the gulf coast of the United States. The result was tremendous flooding, lost power, and widespread damage to personal and public property that left a lasting, negative impact on the area. But these types of impacts are not only caused by extreme storms. Scientists have also predicted the loss of land and coastal property due to rising sea levels.⁴⁸ Because there is a vast amount of the world's population living near the littorals, property impacts in low-lying areas due to rising sea levels have the potential to adversely impact millions of people.

Competition for Resources

"The most direct shipping route from Europe to Asia is fully clear of ice for the first time since records began, the European Space Agency (ESA) says."⁴⁹ This quote

from ESA is significant because the Northwest and Northeast Passages link the Atlantic and Pacific Oceans and provide a shortcut for maritime commerce between Europe and Asia. The passages also provide access to the Arctic's oil and natural gas reserves. The reduction in size of the Arctic ice cap is already causing international disputes over not only rights of passage, but also to those resources under the Arctic Ocean. The ocean is bounded in large part by Canada and Russia, but also reaches the U.S., Greenland, Norway, and Iceland.

The U.S. Geological Survey (USGS) released a report in 2008 estimating the technically recoverable reserves at 90 billion barrels of oil and 1,670 trillion cubic feet of natural gas. Those reserves account for about 22 percent of the worlds undiscovered, technically recoverable reserves. Technically recoverable means that the reserves can be extracted using current technology and industry practices. It should be noted that the USGS survey did not take into consideration the economic factors of recovering the oil.⁵⁰ Nevertheless, it is easy to understand why the competition for access to these reserves will only continue to grow as oil and gas demands increase and current supplies decrease. Additionally, as the price of oil and natural gas rises, recovering these reserves will become more economical.

In a European Union report prepared in early 2008, Scott Borgerson, a former Lieutenant Commander in the U.S. Coast Guard and a Visiting Fellow for Ocean Governance with the Council on Foreign Relations, warned that competition for these reserves could result in armed conflict. He wasn't speaking of armed conflict between Canada and Russia; rather he was speaking of Canada and the United States. Borgerson cautioned, "The United States should not underestimate Canadian passions

on this issue...Unless Washington leads the way toward a multilateral diplomatic solution, the Arctic could descend into armed conflict."⁵¹ This may seem far-fetched, but it is just one illustration of the potential impact that global warming poses vis-à-vis competition for resources.

Of all the potential effects that global warming may pose on U.S. national security the competition for resources could prove to be the gravest. As the aforementioned example shows, competition for resources may require the U.S. to exercise all elements of national power to overcome disputes.

Conclusion

The global warming debate is wrought with contention. On one hand, there is widespread support among many scientists that subscribe to the theory of anthropogenic global warming. These leading scientists in the various fields dealing with climatology have presented compelling evidence to support their theory. On the other hand, there are equally distinguished scientists who contend that the evidence simply does not support the theory that man is at fault for global warming. These scientists can also justify their contrary positions with valid arguments grounded in science. Unfortunately the truth of the matter is that neither side has proven their position to a point where it cannot be refuted.

Within this debate there is one thing that is not in dispute. The earth's climate is changing. Scientists will agree with near unanimity that we are experiencing climate change. Whether this is a good thing or a bad thing becomes a matter of further debate. However, for U.S. leaders and policy makers the issue of global climate change is one

that cannot be ignored. Global warming and in particular, more broadly, global climate change, have the potential to seriously affect U.S. national security interests.

The DNI, using a broad definition for national security, has testified to the Congress that the impact to the U.S. most likely “will be indirect and result from climate-driven effects on many other countries and their potential to seriously affect U.S. national security interests.”⁵² These impacts, such as water, agriculture, extreme weather and property impacts, and competition for resources, will consume U.S. resources and affect one or more elements of national power.

Given these facts, the U.S. government must take seriously the issue of global warming. Regardless of how the science is ultimately decided—if at all—the U.S. will have to deal with the national security issues associated with climate change. The question remains then what policies should the U.S. undertake?

The scientific debate must be re-opened. Much of the international community has fallen into the trap of promoting—or at least accepting—the single view that man is causing global warming. However, because there remains credible scientific evidence to support an opposing view regarding anthropogenic global warming, the U.S. must take a leadership role in not allowing the debate to be silenced.

We do know that burning fossil fuels for energy production contributes to atmospheric pollution and in some cases at dangerously harmful levels. The world witnessed this first hand as it watched China deal with its air quality issues leading up to the 2008 Beijing Olympics. In order to be good stewards of the environment, the U.S. must promote clean energy production while also protecting industry, the engine of the U.S. economy. Nuclear energy remains one of the safest and most effective sources of

clean energy production. At the same time, the U.S. cannot halt the use of coal as a viable and cost effective means of producing electricity. It is imperative that the U.S. develop a comprehensive plan to build new nuclear power plants, and continue research and develop on clean coal technologies.

As the earth's population continues to grow, the competition for water grows. This competition may become even more intense due to pressures caused by global climate change. Clean water for human consumption as well as for agriculture will strain supplies and put pressure on governments to find solutions for this problem. Desalination plants are already in heavy use in places like Saudi Arabia, but the need for clean water is a global one. The U.S. will likely need to build many of its own desalination plants in the coming years. It can and should lead the world in designing and developing new and improved means of producing clean water. This technology should then be shared with the global community.

Finally, the U.S. must provide leadership in the area of disaster response. Time and again the world has witnessed devastation and human suffering brought on by natural disaster. Whether extreme weather and property impacts are a result of global warming or merely climate evolution, there remains a need to respond quickly and effectively to reduce suffering and speed recovery. The U.S. can, and should, use all elements of its national power to achieve this goal. In concert with the international community, it can develop an international framework for disaster response that will be prepared to coordinate and manage an international response similar to the U.S. Federal Emergency Management Agency. Diplomatic, information, military and

economic power all play an important role in the U.S. ability to lead in establishing this framework.

Endnotes

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