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CLIMATE CHANGE AND US NATIONAL SECURITY

PAST, PRESENT, FUTURE

Peter Engelke and Daniel Chiu



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Cover photo credit: Andrew Kelly/Reuters. A largely unlit downtown Manhattan stands under a night sky due to a power blackout caused by Hurricane Sandy in New York October 30, 2012.

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Transatlantic Partnership for the Global Future

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EXECUTIVE SUMMARY

This report examines the past, present, and future of *climate security* in the United States. The term climate security implies that climate change ought to be seen as a threat to core US national security interests, both at home and abroad. Climate change is an environmental stressor that will have potentially serious effects on physical systems (Earth) as well as on human systems, including international relations and geopolitics.

Under a climate security framework, US policymakers could use national security grounds to justify both mitigation and adaptation strategies: mitigation strategies to reduce the threat of a changing climate, and adaptation strategies to increase American society's resilience in the face of that threat.

Climate security has become a useful concept in a five-decades-old field tying environmental change to national and global security. The question going forward is whether climate security will remain restricted to discussions within academia, civil society, and a few dedicated places within the US government, or if it will acquire a more pivotal role in the formulation of US national security strategy.

CLIMATE SECURITY'S PAST

Between the 1960s and 1990s, social and intellectual currents, combined with real-world events, produced a field of work now called "environmental security." During the 1960s and 1970s, the Vietnam War, the Cold War, and two global oil shocks (1973 and 1979) all influenced thinking about US national security and its relationship to the natural environment. During the late 1980s and early 1990s, the end of the Cold War brought about a search for new models of international security. Rising concern about global environmental degradation, including from climate change, prompted increased activity by multilateral institutions, as well as within the US government. During the 2000s, civil society continued to drive the environmental security agenda—and, eventually, the climate security agenda—forward. Real-world events also mattered, particularly Hurricane Katrina's devastation of New Orleans in 2005.

CLIMATE SECURITY'S PRESENT

During President Barack Obama's administration, the United States' ongoing political divide regarding climate change has had real consequences for how climate security is practiced. Mitigation strategies

are left to the few departments and agencies within the executive branch that are tasked with developing them—the Environmental Protection Agency (EPA) on the domestic policy side and the State Department on the foreign policy side. The rest of the US government focuses on adaptation strategies, driven by the Obama administration's executive orders, which require departments and agencies to engage in adaptation planning.

As security and defense agencies and departments are not exempt from these requirements, adaptation strategies and plans have become a routine part of the Obama administration's strategic assessments. Within the Department of Defense, adaptation planning has been especially prominent in the Navy, and particularly from the Assistant Secretary of Defense for Energy, Installations, and Environment.

CLIMATE SECURITY'S FUTURE

Absent breakthroughs in the current political stalemate surrounding climate change, climate security will remain confined to the edges of US national security strategy, and will focus almost exclusively on adaptation. There are two possible pathways out of this stalemate. Pathway one is economic, wherein shifts in the American energy landscape, which is already moving toward a lower-carbon future, drive political change. Shifts in the energy sector, and related developments elsewhere in the economy, will likely change US climate politics by turning a constellation of economic interests toward low-carbon energy sources. Pathway two reflects the influence that climate-fueled natural disasters might have on the US homeland and on public opinion. Past disasters, such as Hurricanes Katrina and Sandy, impacted the politics of climate change, but the effects were temporary.

Unless the political conversation about mitigation changes in the United States, through either of these two pathways, the climate security agenda will likely remain focused on how best to adapt to a changing climate. Given the carbon loading of the atmosphere, adaptation strategies will feature in every society's planning for the foreseeable future. However, absent mitigation, a changing climate could feasibly overwhelm adaptation efforts. Under such circumstances, a state or even an individual might turn to geoengineering (also referred to as climate engineering) in order to fashion a solution. Yet attempts to geoengineer the Earth's ecosystems would

be risky because geoengineering is an unproven field and such efforts would hold unknown consequences.

RECOMMENDATIONS

This paper offers two recommendations. First, **create a set of scenarios to spell out the security consequences of alternative future climates.** These scenarios would describe, analyze, and project the national security consequences of different climates into the future, and would address the security consequences for the United States, its allies, and its partners. Would it be possible for the US military to adapt its many installations around the world to the changing conditions outlined in each scenario? How would the US government plan for national disasters within the United States and abroad under each scenario? Would the United States be forced to rethink its strategies toward world regions, based on the climatological effects forecast by the scenarios?

The second recommendation is much broader: **make the climate security concept part of a comprehensive narrative tying climate insecurity to the United States' core national interests.** Climate security remains a narrative that is only partially integrated into the United States' larger public debate about climate change. At times, the relationship between climate change and US national security breaks into mainstream dialogue, but

such moments are brief rather than sustained. It will be difficult to place climate change firmly within the mainstream debate surrounding US national security. The fact is that more tangible and more kinetic forms of insecurity will always exist (e.g., terrorists will kill innocents and rogue states will threaten their neighbors), and they will demand priority responses.

To work climate security more firmly into the mainstream US national security agenda, it needs to be **framed as a long-term threat to US national security, requiring sustained attention to a fight against a determined and increasingly powerful foe.** The “threat multiplier” concept (in this case, it refers to climate heightening the risk or intensity of a threat), in use for years now, remains a proper one to frame climate threats to US interests around the world (e.g., drought is an indirect cause of instability in world regions that are vital to the United States). But a far more compelling appeal should be to stress climate change's direct threat to the US homeland—to its landmass, ecosystems, coastlines, farms, cities, and infrastructure. Although Hurricanes Katrina and Sandy had only temporary impacts on how Americans thought about and debated climate change, those storms drove home a visceral point about climate insecurity that no rhetoric about threat multipliers could ever evoke.

INTRODUCTION

Will a changing climate reshape US national security interests in the years to come? The answer is a definitive yes: an altered climate will affect US security interests at home and abroad. The causes of climate change, the degree to which the Earth's climate is changing, and the policy responses to that change all may be controversial topics in contemporary American politics. However, defense and security planners within the US government now assume that they must prepare the country's national security apparatus for the near- and long-term consequences of climate change. This essay examines the past, present, and future of *climate security*, a concept that links climate change to the kinds of issues that vex defense and security planners in the United States. This essay resulted from research conducted through an ongoing partnership between the Atlantic Council's Brent Scowcroft Center on International Security and the government of Sweden, a partnership that examines the long-term future for the United States and its partners and allies around the world.

Climate security is tied intellectually to environmental security, a field of thought that is now several decades old and that emphasizes the many linkages between the natural environment and both global and national security. Its basic premise is that natural systems are interwoven with economic, social, and political systems. Hence, when natural systems change, the consequences reverberate within human systems. Under some conditions, environmental change might create insecurity, up to and including challenges such as state fragility, forced migrations, rising extremism, civil conflict, and even the most traditional of security worries, interstate warfare.¹ This field emphasizes how environmental stressors—such as severe drought or collapsing ecosystems—create or enhance insecurity within a country or region. A classic hypothesis, one that has been advanced to partially explain the onset of the current Syrian conflict, is how

drought-induced migration can contribute to social breakdown and even civil war.²

“Climate security” refers to the threat posed by climate change to global and national security. Like environmental security, climate security is a decades-old concept, embedded in the notion that climate change is linked to global and national security concerns, in both direct and indirect ways. Climate security implies that climate change should be seen as a threat to core US national security interests, both at home and abroad. Here, climate change is regarded as an environmental stressor that degrades social, economic, political, and physical systems.³ Its effects will have consequences for friendly and hostile countries alike, risking their domestic stability and external relations.

For some countries, this threat is existential. During this century, for example, rising sea levels driven by climate change could potentially wipe low-lying island states off the map. Driven by national security considerations, a group of these countries (the Alliance of Small Island States, or AOSIS) has been pushing for a strong United Nations (UN) climate agreement.⁴

For other states, the national security threat might be real and dangerous, but not (in all probability) an existential one. The United States is in this position: while the North American landmass will not disappear, the US homeland nonetheless will suffer from the increasingly severe effects of climate change. US natural resources (e.g., soil, forests, freshwater systems), infrastructure, cities, and citizens will all bear the brunt of these changes.

The climate security framework supports both adaptation and mitigation strategies. Adaptation refers to attempts to reduce societal vulnerabilities to

Climate security implies that climate change should be seen as a threat to core US national security interests, both at home and abroad.

1 Christine Parthemore with Will Rogers, *Sustaining Security: How Natural Resources Influence National Security*, Center for a New American Security, June 2010, http://www.cnas.org/files/documents/publications/CNAS_Sustaining%20Security_Parthemore%20Rogers.pdf.

2 See, e.g., Colin P. Kelley et al., “Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought,” *PNAS: Proceedings of the National Academies of Science*, vol. 112, no. 11, March 2, 2015, pp. 3241–3246, www.pnas.org/cgi/doi/10.1073/pnas.1421533112.

3 The Center for Climate Security, “Climate Security 101,” <http://climatesecurity101.org>.

4 These countries have organized themselves into the Alliance of Small Island States (AOSIS), which advocates for strong climate agreements within the United Nations. See <http://aosis.org>.



US Navy crewman assists disaster victims in the aftermath of Typhoon Haiyan. Samar Province, Philippines, November 17, 2013. Photo credit: US Navy/Wikimedia.

climate change and build resilience to the same, while mitigation refers to the reduction of greenhouse-gas emissions in an effort to prevent changes to the Earth's existing climate.⁵ American policymakers could justify both mitigation and adaptation strategies on national security grounds: mitigation strategies to reduce the threat of a changing climate and adaptation strategies to increase society's resilience in the face of that threat.

Within the US government, the climate security agenda has been confined mostly to the adaptation strategy. Since the late 1980s, the bulk of attention has been paid to climate change's impacts on US military operations at home and abroad, or to the impacts on foreign countries, especially to fragile states around the world.⁶ The security and development communities in the United States stress different parts of this formulation. In practice, the security community, especially the US Department of Defense, focuses more on impacts

to US military facilities, on supply chains around the world, and on climate impacts abroad that will require a US military intervention (for instance, more frequent humanitarian and disaster-relief operations in response to severe storms), as well as on making plans for all of the above.⁷ The development community focuses more on the human security impacts of climate change. The US Agency for International Development (USAID) views climate change as a stressor that will worsen existing development challenges.⁸ Climate insecurity is believed to increase risk to life, property, and settlements, especially among marginalized populations, and therefore to increase the risk of conflict. "Human insecurity is the necessary link between climate change and conflict," according to USAID.⁹

5 Definitions from United Nations Environment Programme, <http://www.unep.org/climatechange>.

6 Philip Bump, "The Long History of Linking Climate Change to American Security," *Washington Post*, May 20, 2015, <https://www.washingtonpost.com/news/the-fix/wp/2015/05/20/the-long-history-of-linking-climate-change-to-american-security>.

7 *National Security Implications of Climate-Related Risks and a Changing Climate*, US Department of Defense, July 23, 2015, pp. 3-5, <http://fas.org/man/eprint/dod-climate.pdf>.

8 *USAID Global Climate Change and Development Strategy 2012-2016*, US Agency for International Development, January 2012, http://pdf.usaid.gov/pdf_docs/PDACS780.pdf.

9 Jeffrey Stark, Christine Mataya, and Kelley Lubovich, *Climate Change, Adaptation, and Conflict: A Preliminary Review of the Issues*, CMM Discussion Paper No. 1, US Agency for International Development, October 2009, http://pdf.usaid.gov/pdf_docs/PNADR530.pdf.

CLIMATE SECURITY'S PAST

While scholars have linked the security of the state to the natural environment for millennia, it was not until the late twentieth century that scholars and practitioners began systematically exploring this linkage.¹⁰ Between the 1960s and 1990s, social and intellectual currents, combined with real-world events, produced a field of work now called *environmental security*.

The mass environmental movement of the 1960s and 1970s represented changing popular and elite opinion about the natural world. During those decades, Americans were also rethinking their country's role in global affairs, including the Cold War and the Vietnam War. Both of those conflicts had environmental dimensions. Atmospheric nuclear testing during the Cold War helped bring about the environmental movement, while the defoliant Agent Orange came to exemplify the folly of the Vietnam War. Other contemporary events, including the 1973 and 1979 oil crises, also prompted many in the United States to begin thinking seriously about the relationship between natural resources and the nation's security.

This environment-security linkage was made more explicit during the 1980s. In 1983, Princeton University's Richard Ullman penned an influential essay about the overly narrow definition of national security. He argued that the emphasis on military power as the *sine qua non* of national security had created "a profoundly false image of reality," which led to a "pervasive militarization of international relations that in the long run can only increase global insecurity."¹¹ Others echoed Ullman's plea during the 1980s, including the authoritative Brundtland Commission, which in 1987 published *Our Common Future*, a report that turned the phrase "sustainable development" into a mainstream concept. The commission dedicated an entire chapter of the report

to the connections between security and environment, starting with a subchapter heading bluntly titled "Environmental Stress as a Source of Conflict."¹²

The end of the Cold War, from 1989 to 1991, accelerated a search for new models of national and global security. Many emphasized the need to diversify the security concept.¹³ The United Nations (UN) took a prominent role in highlighting environmental stewardship; in 1992, it organized the "Earth Summit" in Rio de Janeiro to draw attention to global environmental challenges. Specifically on the climate front, the UN created the Intergovernmental Panel on Climate Change (IPCC) in 1988; its first two assessment reports in 1990 and 1995 were highly scrutinized documents.¹⁴ The decade closed with the Kyoto Protocol, negotiated under the auspices of the UN Framework Convention on Climate Change (UNFCCC).

Events ... prompted many in the United States to begin thinking seriously about the relationship between natural resources and the nation's security.

Developments within the United States paralleled this outburst of global activity. In its 1991 National Security Strategy, the George H.W. Bush administration included a brief nod to global environmental stewardship, reflecting a post-Cold War search for new frameworks for global governance and the United States' role in it.¹⁵ President Bill Clinton's administration took things further, in part due to Vice President Al Gore's green credentials (his widely read book,

Earth in the Balance, appeared in print a year before he took office).¹⁶ The Clinton administration created the first environmentally focused offices within the US Department of Defense, the most significant of which was the Office of the Deputy Undersecretary of Defense for Environmental Security (DUSDES).

10 Unless otherwise cited, information in this section is from Rita Floyd and Richard A. Matthew, *Environmental Security: Approaches and Issues* (New York: Routledge, 2015), pp. 1-20; and Carsten F. Ronnfeldt, "Three Generations of Environment and Security Research," *Journal of Peace Research*, vol. 34, no. 4, 1997, pp. 473-482.

11 Richard H. Ullman, "Redefining Security," *International Security*, vol. 8, no. 1, summer 1983, p. 129.

12 World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987), chapter 11.

13 Geoffrey D. Dabelko, "An Uncommon Peace: Environment, Development, and the Global Security Agenda," *Environment*, May/June 2008, <http://www.environmentmagazine.org/Archives/Back%20Issues/May-June%202008/Dabelko-full.html>.

14 Intergovernmental Panel on Climate Change, *Introduction: The Intergovernmental Panel on Climate Change (IPCC)*, IPCC Secretariat, undated, <http://www.ipcc.ch/pdf/ipcc-faq/ipcc-introduction-en.pdf>.

15 *National Security Strategy of the United States*, The White House, August 1991, p. 22.

16 Al Gore, *Earth in the Balance: Ecology and the Human Spirit* (Boston: Houghton Mifflin, 1992).



Nuclear age, nuclear anxiety: a mushroom cloud over Bikini Atoll, July 1946. Atmospheric nuclear testing eventually generated a backlash within the United States, influencing the thinking of people who would lead the mass environmental movement of the 1960s and 1970s. Photo credit: United States Department of Defense/Wikimedia.

Headed by Sherri Goodman, the office was given the challenging task of defining exactly how military operations impacted the environment, and vice versa.¹⁷ It focused on military base cleanup and engagement with foreign militaries on environmental matters, resource efficiency, and pollution reduction.¹⁸

By 2001, when President George W. Bush entered office, environmental security was a mature concept, firmly established in some contexts—but, at the same time, on the margins of many others. Over the course of the Bush administration, civil society, including Washington’s think tanks, continued to push for the incorporation of environmental security, especially climate security, into the national security agenda. Perhaps the most significant document to emerge during the Bush administration was a 2007 report issued by the Center for Naval Analyses (CNA), which labeled climate change “a serious threat to America’s national security” and “a threat multiplier for instability” around the world.¹⁹ The CNA report’s

message resonated with a wide audience in large part because of the status of its authors, namely the retired generals and admirals of CNA’s Military Advisory Board, making it difficult for critics to dismiss the document as an environmental polemic.²⁰ A recommendation contained in the report, to include climate security considerations into the US government’s core strategic documents (for example, the National Security Strategy), received bipartisan support on Capitol Hill and eventual incorporation into the 2008 (fiscal year) Defense Authorization Bill. CNA’s work was organized by its President, Sherri Goodman (formerly at DUSDES), who coined the phrase “threat multiplier,” now a mainstream idea in the environmental security field.²¹

During the Bush years, real-world events continued to prove critical. After the terror attacks of September 11,

17 Sherri Goodman is an Atlantic Council board member.

18 Floyd and Matthew, *Environmental Security: Approaches and Issues*, op. cit., pp. 4-6.

19 *National Security and the Threat of Climate Change*, CNA Corporation, 2007, p. 6. Other think tanks also produced well-received work at this time. See, e.g., Kurt M. Campbell et al., *The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change*, Center for

Strategic and International Studies and Center for a New American Security, November 2007.

20 See Caitlin E. Werrell and Francesco Femia, *Climate Change as Threat Multiplier: Understanding the Broader Nature of the Risk*, BRIEFER 25, Center for Climate and Security, February 12, 2015, https://climateandsecurity.files.wordpress.com/2012/04/climate-change-as-threat-multiplier_understanding-the-broader-nature-of-the-risk_briefer-252.pdf.

21 Dan Vergano, “Meet the Woman Whose Two-Word Catchphrase Made the Military Care about Climate,” *BuzzFeed*, November 29, 2015, <http://www.buzzfeed.com/danvervano/the-threat-multiplier>.



Motorists line up for fuel at a gas station in Maryland, the United States, June 1979. The 1970s' twin oil shocks (1973, 1979) forced Americans to think hard about their nation's dependence on this critical natural resource. Photo credit: Warren K. Leffler/Library of Congress.

2001, Washington's strategic focus turned decisively toward hard-security issues, where it stayed for the duration of the first Bush term. However, in August 2005, Hurricane Katrina's devastation of New Orleans realized fears of climate-fueled monster storms ravaging the American coastline.²² In the words of one observer at the time, Katrina "began to alter the terms of the [American] climate debate" by moving it in a national security direction.²³ Through the end of the Bush years, that debate found wider expression: through think tanks like CNA; Congress, which pressed

US intelligence services to provide climate security assessments; multilateral institutions (in 2007, the UN Security Council held its first-ever session on climate security, while the IPCC released its fourth assessment report); and Defense Department strategic-planning documents, which suggested (if somewhat vaguely) that climate-driven and natural-resource-driven pressures would affect US national security interests in the future.²⁴

22 By 2005, the climate-disaster hypothesis had been around for years, with versions having found their way into the Bush administration. The most spectacular was a paper commissioned in 2003 by the Defense Department, which painted a future wherein the United States faced cataclysmic natural disasters: Peter Schwartz and Doug Randall, *An Abrupt Climate Change Scenario and Its Implications for United States National Security*, Global Business Network, 2003.

23 Joshua W. Busby, *Climate Change and National Security: An Agenda for Action*, Council on Foreign Relations, no. 32, November 2007, p. 1, <http://www.cfr.org/climate-change/climate-change-national-security/p14862>.

24 Busby, *Climate Change and National Security*, op. cit., p. 1; Joshua W. Busby, "Who Cares about the Weather?: Climate Change and US National Security," *Security Studies*, vol. 17, no. 3, 2008, pp. 484-487, <http://www.utexas.edu/lbj/faculty/busby/wp-content/uploads/securitystudies.pdf>; "Security Council Holds First-Ever Debate on Impact of Climate Change on Peace, Security, Hearing over 50 Speakers," UN Security Council press release, April 17, 2007, <http://www.un.org/press/en/2007/sc9000.doc.htm>; Thomas Fingar, "National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030," statement to House Permanent Select Committee on Intelligence and House Select Committee on Energy Independence and Global Warming, June 25, 2008, http://fas.org/irp/congress/2008_hr/062508fingar.pdf; US Department of Defense, *2008 National Defense Strategy*, 2008, pp. 4-5.

CLIMATE SECURITY'S PRESENT

In 2009, President Barack Obama entered office wanting to prioritize climate change. Shortly after taking office, he appointed Carol Browner, former head of the US Environmental Protection Agency (EPA) under President Clinton, as director of the White House Office of Energy and Climate Change, a new entity. Her appointment as climate “czar” was a tangible sign of the incoming administration’s desire to move aggressively on the climate issue. Under Browner’s guidance, the White House sought comprehensive climate and energy legislation, negotiated new fuel-efficiency standards, coordinated the response to the Deepwater Horizon oil spill, and included renewable-energy incentives in the 2009 economic stimulus package.²⁵ However, after the 2010 midterm elections, the most aggressive components of this climate agenda fizzled, especially comprehensive climate and energy legislation. The Office of Energy and Climate Change fell victim to opposition on Capitol Hill, which refused to fund it, leading to its closure; Browner herself left the administration in March 2011.²⁶

Browner’s tenure, and her office’s fate, encapsulated a central reality that has shaped the American climate security debate ever since—the impact of the United States’ political divide on climate change. Since the 2010 electoral cycle, the Obama administration has been unable to move any part of its climate agenda through a congressional majority that remains skeptical of anthropogenic climate change. The administration has had to turn away from its most ambitious goals, in favor of nonlegislative options. A good example is the EPA’s classification of carbon dioxide as a harmful pollutant under the 1970 Clean Air Act, a move that, if upheld by the courts, would allow the administration to regulate power-plant emissions without new legislation.²⁷ John Podesta’s 2014

The United States’ political divide on climate security strategy and policy has had real consequences.

appointment as the White House’s climate and energy “czar” in the Browner mold did not alter this political dynamic. Podesta’s year-long tenure successfully advanced several items on the White House’s climate agenda. Yet, all of these items were confined to actions that the executive branch could take on its own, which necessarily meant a limited agenda. Podesta admitted that, absent congressional action in the form of comprehensive climate and energy legislation, no administration—neither the Obama administration nor any of its successors—would be able to successfully overcome the climate challenge.²⁸

The United States’ political divide on climate security strategy and policy has had real consequences. The most important has been the emphasis placed on adaptation. As discussed above, a comprehensive climate security strategy *in theory* would have both mitigation and adaptation components, as a country’s national security is best protected by using both an offensive strategy designed to defeat an enemy (a mitigation strategy, in the climate case) and a defensive one designed to resist an enemy (an adaptation strategy). The current political environment renders the first part of this equation moot. Mitigation—

basically, switching from a high-carbon to a low-carbon economy, and negotiating global agreements to accomplish the same—has become the explosive ground upon which climate politics in the United States is fought.

Mitigation strategies are left to the few departments and agencies within the executive branch that are

25 “Carol Browner Leaving as Obama Adviser,” *Associated Press*, January 24, 2011, <http://www.cbsnews.com/news/carol-browner-leaving-as-obama-adviser>.

26 Kate Sheppard, “Browner’s Out at White House,” *Mother Jones*, March 3, 2011, <http://www.motherjones.com/mojo/2011/03/browners-out-white-house>.

27 Robert Fares, “Clean Power Plan Will Limit Carbon Emissions from US Electricity Generation,” *Scientific American*, August 5, 2015, <http://blogs.scientificamerican.com/plugged-in/clean-power-plan-will-limit-carbon-emissions-from-u-s-electricity-generation>. In February 2016, the Supreme Court stayed the implementation of the Clean Power Plan until a lower court

could rule on its merits. See Greg Stohr and Jennifer Dlouhy, “Obama’s Clean-Power Plan Put on Hold by US Supreme Court,” *Bloomberg*, February 9, 2016, <http://www.bloomberg.com/politics/articles/2016-02-09/obama-s-clean-power-plan-put-on-hold-by-u-s-supreme-court>.

28 Juliet Eilperin, “John Podesta: The Man Behind President Obama’s New Environmental Push,” *Washington Post*, March 4, 2014, https://www.washingtonpost.com/politics/john-podesta-the-man-behind-president-obamas-new-environmental-push/2014/03/03/fa6ba57e-9f5a-11e3-b8d8-94577ff66b28_story.html; Juliet Eilperin, “A Year in the White House: John Podesta Reflects on Obama’s Environmental Record,” *Washington Post*, February 23, 2015, <https://www.washingtonpost.com/news/energy-environment/wp/2015/02/23/a-year-in-the-white-house-john-podesta-reflects-on-obamas-environmental-record/>.

tasked with developing them—EPA on the domestic policy side, and the State Department on the foreign policy side (working largely through the UN’s climate negotiation process). The rest of the US government focuses on adaptation strategies, driven by Obama administration executive orders, which require departments and agencies to engage in adaptation planning. Even here, however, politics is never far away: Congress scrutinizes adaptation efforts, and has attempted to cut budgets for work related to climate adaptation.

As security and defense organizations are not exempt from adaptation-planning requirements, adaptation strategies and plans have become a routine part of this administration’s security and defense assessments.²⁹ Both the 2010 and 2014 Quadrennial Defense Reviews (QDRs) highlighted climate change as a threat to US military operations. In June 2014, following the logic contained in these QDRs, the Defense Department issued a Climate Change Adaptation Roadmap (CCAR) that stressed how the department was planning for future climate impacts along four dimensions—on the department’s bases and facilities, its training and testing preparedness, its global supply chains, and its operations in rapidly changing environments.³⁰

One could dismiss even high-level documents like the QDRs and the CCAR, which are designed for public consumption, as rhetorical statements. However, strategic documents such as these are treated as authoritative within the Defense Department, providing guidance for policy development. And for years, Defense Department officials have planned for a changing natural world. Near-term planning includes preparing for the expected impacts of climate change on defense facilities (e.g., bases, ports, and other infrastructure). Sea-level rise, higher temperatures, increased drought and forest fires, and other climate-driven phenomena will all impact Defense Department facilities and the ability to train and test. Coastal ports run the risk of greater flooding during storms, while inland facilities might face higher temperatures or more frequent droughts. These risks will not only affect where and when the department can operate, but how it operates, as well as what it purchases in the way of material, equipment, infrastructure, and weapons systems. Planning to meet long-term challenges

includes paying attention to how a changing climate might reshape the security environment in which the US military operates. Here, much attention focuses on the increased need for humanitarian and disaster-relief operations abroad, and on how certain regions of the world might become less stable and more violent due to the destabilizing effects of climate change.³¹

Regarding installations, the departmental lead is the Assistant Secretary of Defense for Energy, Installations, and Environment, an office tasked with ensuring that the department’s facilities remain fully functional into the future at a reasonable cost. This office translates forecasted changes in specific environments (e.g., deserts, coastal areas, islands, the Arctic) into Defense Department plans. If, for example, a region is forecasted to come under severe water stress in the future, this office is charged with designing plans to anticipate, minimize, or overcome the problem—perhaps by making bases in that region more water efficient.³²

The Navy has carved out a reputation as the most forward-leaning service in the Defense Department, in large part because of the swiftly changing aquatic environments in which it operates. Climate-driven changes to some theaters, most visibly the Arctic Ocean, are forcing the Navy to reconsider how it plans for the future in such areas. A changing Arctic is reworking geopolitics at the top of the world, with a host of countries—Russia, the United States, China, and many others—all vying for economic and strategic access to the ocean and its resources.³³ The Navy also fears it will have to engage in more humanitarian and disaster-relief efforts around the world as sea levels rise and storms become more powerful and frequent. Such concerns motivated the Navy to convene a Task Force Climate Change, which in 2010 produced a service-specific roadmap that outlined how the Navy would

29 Exec. Order No. 13,514, 3 C.F.R. 13514, “Federal Leadership in Environmental, Energy, and Economic Performance,” October 5, 2009; and Exec. Order No. 13,653, 3 C.F.R. 13653, “Preparing the United States for the Impacts of Climate Change,” November 1, 2013.

30 Office of the Deputy Under Secretary of Defense for Installations and Environment, *Climate Change Adaptation Roadmap* (Washington, DC: US Department of Defense, June 2014).

31 The near-term/long-term distinction is drawn from Daniel Y. Chiu, “Statement by Dr. Daniel Y. Chiu, Deputy Assistant Secretary of Defense for Strategy and Force Development on the National Security Implications of Climate Change,” statement to Senate Committee on Foreign Relations, Subcommittee on International Development and Foreign Assistance, Economic Affairs, International Environmental Protection, and Peace Corps, July 22, 2014, http://www.foreign.senate.gov/imo/media/doc/Chiu_Testimony.pdf.

32 Defense Installations Strategic Plan, Office of the Deputy Under Secretary of Defense for Installations and Environment, 2007, Objective 1.3, <http://oai.stic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA487620>.

33 US Department of the Navy Chief of Naval Operations, *The United States Navy Arctic Roadmap for 2014 to 2030*, Department of the Navy, 2014, <http://greenfleet.dodlive.mil/files/2014/02/USN-Arctic-Roadmap-2014.pdf>; Jeremy Rosenberg, “US Navy Bracing for Climate Change,” *NASA.gov*, March 22, 2012, <http://climate.nasa.gov/news/699>.



Polar bears approach the USS Honolulu somewhere in the Arctic Ocean, ca. 2003. Photos of surfaced submarines, surrounded by Arctic ice, were part of the Cold War's iconography. Polar bears today are icons as well, beautiful but tragic symbols of the Arctic's swiftly-changing ecology. *Photo credit: US Navy/Wikimedia.*

begin grappling with climate change.³⁴ The Navy's deep oceanographic and meteorological capabilities also now provide the rest of the Department of Defense with much of its expertise in climate data and modeling.

The department's planning reflects how the physical world in which the US military operates is changing swiftly. This has forced it to reconsider how it does business in very practical terms, and the popular press has begun to notice. In February 2015, *Rolling Stone* released a major piece on how climate change has already eroded US national security through

measurable impacts on the Defense Department's ports, bases, and other facilities. Focusing his essay on coastal inundation of low-lying military installations in Norfolk, Virginia, reporter Jeff Goodell argued that "virtually all" of the Pentagon's five hundred thousand-plus facilities will be affected by climate change during the coming decades, and that some, like those in Norfolk, might have to be abandoned altogether. "We are now committed to a future of disorder and conflict," he wrote in a discouraging assessment at the prospects, "one in which today's emergencies will always interrupt tomorrow's plans."³⁵

³⁴ US Department of the Navy Vice-Chief of Naval Operations, *US Navy Climate Change Roadmap*, Department of the Navy, 2010, <http://greenfleet.dodlive.mil/files/2010/08/US-Navy-Climate-Change-Roadmap-21-05-10.pdf>.

³⁵ Jeff Goodell, "The Pentagon and Climate Change: How Deniers Put National Security at Risk," *Rolling Stone*, February 12, 2015, <http://www.rollingstone.com/politics/news/the-pentagon-climate-change-how-climate-deniers-put-national-security-at-risk-20150212>.

CLIMATE SECURITY'S FUTURE

Climate security has become a useful concept in a five-decade-old field tying environmental change to national and global security. The question going forward is whether climate security will remain restricted to discussions within academia, civil society, and a few dedicated places within the US government, or if it will acquire a more pivotal role in the formulation of US national security strategy.

Climate security's fate will depend, to a great extent, on the evolution of the United States' political debate about climate change. Absent breakthroughs in the current stalemate, climate security will remain a limited phenomenon, confined to the edges of US grand strategy and focused almost exclusively on adaptation. The Obama administration's attempts to develop adaptation plans within the executive branch would roughly represent the maximum that could be expected in this scenario. The most active parts of the government would be those departments and agencies that possess many facilities (such as the Defense Department) or are responsible for disaster planning and response (such as the Federal Emergency Management Agency).

Under this scenario, other parts of society would begin to take the lead in adaptation planning, as cities and states become more aware of their vulnerabilities to a changing climate. One prominent example is New York City's planning for an increasingly unstable climate, especially after its Hurricane Sandy experience.³⁶ The private sector can also be expected to take a more prominent role in adaptation. The insurance industry, which is in the business of pricing risk, will at some point start refusing to insure real estate in areas with the highest risk of climate-induced disasters, as in the case of real estate built along low-lying coastlines that are vulnerable to storm damage. The insurance industry is already factoring climate risk into its rate calculations.³⁷

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For climate security to figure more prominently in US national security strategy, the political stalemate about mitigation almost certainly will have to change. Basing a comprehensive climate security strategy on a purely defensive footing, which is what adaptation is, would be illogical. Absent a mitigation component, an adaptation-centric strategy basically means that policymakers would be willing to tolerate the permanent existence of a foe that keeps getting stronger over time.

TWO PATHWAYS

There are two possible pathways out of the climate security stalemate. *Pathway one* is economic, wherein shifts in the American energy landscape, which is already moving toward a lower-carbon future, drive political change. The shale revolution has turned natural gas into a very plentiful and cheap lower-carbon fossil fuel, at least compared with coal. As of this writing, gas is on the cusp of supplanting coal as the United States' leading fuel for electrical-power generation, for the first time in history.³⁸ Massive investment in renewable forms of energy in the United States and around the world, largely in wind and solar power, is also an important part of this storyline. While wind and solar together still produce only a small fraction of US electrical-power generation (in 2014, roughly 5 percent), both have been on rapid growth trajectories for more than a decade.³⁹

Swift technical development, favorable investment incentives, and intense global competition have combined to dramatically reduce renewable costs and increase investment in large- and small-scale

face of ongoing climate change. "Unless owners and societies take steps to reduce their exposure to the damages and losses associated with extreme weather, the overall affordability and availability of insurance will be affected." Sarah Jo Peterson, *What the Real Estate Industry Needs to Know about the Insurance Industry and Climate Change*, Urban Land Institute, 2014, p. 2.

36 Alan Feuer, "Building for the Next Big Storm: After Hurricane Sandy, New York Rebuilds for the Future," *New York Times*, October 25, 2014, http://www.nytimes.com/2014/10/26/nyregion/after-hurricane-sandy-new-york-rebuilds-for-the-future.html?_r=0.

37 A report by the Urban Land Institute claimed that "maintaining the insurability of individual properties is not a given" in the

38 "Natural Gas Overtakes Coal in US Electric Generation," *New York Times*, July 13, 2015, <http://www.nytimes.com/2015/07/14/business/natural-gas-overtakes-coal-in-us-electric-generation.html>.

39 "What Is US Electricity Generation by Energy Source?" US Energy Information Administration, <http://www.eia.gov/tools/faqs/faq.cfm?id=427&t=3>.



renewable projects. Wind energy has expanded rapidly, even in the face of falling natural gas prices: between 2007 and 2014, wind power represented one-third of all additions to US electricity-generation capacity. In 2014, wind prices reached a new low of 2.35 cents per kilowatt hour (kWh) for long-term supply contracts, representing a decline of about two-thirds over the previous five years. The wind industry grew from a combination of rapidly improving technology (e.g., better and larger rotors, improved siting, taller windmills), public investment assistance (in wind's case, the production tax credit), and falling manufacturing costs. The industry has grown to scale very fast. It now employs some seventy-three thousand people in the United States, representing a transformation from a fringe sector to mainstream in a few short decades.⁴⁰ Few analysts now doubt renewables' march toward grid parity (the price at which an energy source is competitive against the cheapest commercial sources, absent subsidies or other public support). A widely cited 2015 Deutsche Bank report argued that solar prices will continue to

fall rapidly, even in the face of declining oil and gas prices, and will reach grid parity in many countries as early as 2017.⁴¹

These shifts in the energy sector—and related developments elsewhere in the economy, including the rapid development of green-tech sectors such as electric vehicles and battery systems—would almost certainly change US climate politics by turning a constellation of economic interests toward low-carbon energy sources. A split in the business world is already well underway, as the Obama administration has courted major US companies—including tech giants Google, Apple, and Intel, as well as companies from more traditional sectors, such as General Motors—to sign onto its climate agenda. Much of the administration's activity was designed to deflect criticism that a climate agreement coming out of the 2015 UNFCCC talks in Paris would hurt the private sector.⁴²

40 Lawrence Berkeley National Laboratory, *2014 Wind Technologies Market Report Highlights*, US Department of Energy, 2015, pp. 2-7; Robinson Meyer, "How Solar and Wind Got So Cheap, So Fast," *Atlantic*, December 2, 2015, <http://www.theatlantic.com/technology/archive/2015/12/how-solar-and-wind-got-so-cheap-so-fast/418257/>.

41 Vishal Shah and Jeremiah Booream-Phelps, "Crossing the Chasm - Solar Grid Parity in a Low Oil Price Era," Deutsche Bank AG, February 27, 2015, https://www.db.com/cr/en/docs/solar_report_full_length.pdf.

42 "Obama Says Paris Climate Pledge Good for US Business," *Reuters*, October 19, 2015, <http://www.reuters.com/article/us-usa-climatechange-idUSKCN0SD1HL20151019>.

Pathway two consists of the impact that climate-fueled natural disasters might have on the US homeland, and how such disasters might shift public opinion concerning climate change. Past disasters, such as Hurricanes Katrina and Sandy, did result in more visible attention to the linkages between climate change, disasters, and the physical security of the American landmass. However, the effects that these storms had on public opinion proved only temporary. A major question going forward is whether this pattern will continue, or whether the impact of future mega-storms and other significant natural disasters (say, the California drought) will permanently shift public opinion in a climate security direction.

Scientists predict that more damaging natural disasters—not just hurricanes, but wildfires, floods, and droughts—will occur more often as the atmosphere and oceans warm (more heat means more powerful storms), and as precipitation patterns shift.⁴³ Indeed, trends are pointing in this direction: the National Oceanic and Atmospheric Administration recently announced that 2015 was the “Earth’s warmest year by [the] widest margin on record,” eclipsing the previous record, which was set in 2014.⁴⁴ At some point, the frequency and scale of climate-fueled natural disasters should begin to shift popular opinion in the United States, even among groups that remain skeptical of anthropogenic climate change. From there, the appeal to US national security interests—specifically to the protection of American territory, resources, infrastructure, property, and citizenry—will have more resonance with the general public. How long that process will take is an open question.

A mundane but necessary part of the answer is to improve severe weather prediction capabilities. The US government’s Earth System Prediction Capability (ESPC), formed as a cooperative venture by the US departments of defense, energy, and commerce in addition to the National Aeronautics and Space

Administration (NASA) and other agencies, is designed to increase predictive capabilities from days to weeks and even longer, for example for tropical storms such as cyclones and hurricanes. Most importantly, improving these capabilities would reduce loss of life and property from severe storms. In addition, doing so should reduce the temptation to treat individual storms as isolated events detached from longer patterns.⁴⁵

A GIANT RISK

Unless the American political conversation about climate mitigation alters through either of these two pathways, the climate security agenda will likely remain focused on how best to adapt to a changing climate. Given the additional carbon loading of the atmosphere that is almost certain to occur over the coming decades, there is no question that societies will have to adapt to a changing climate. Yet, at some point, climate change’s impacts might begin to overwhelm all

efforts at adaptation. Coastal rise could begin to swamp low-lying island states, drought might turn fertile breadbaskets into deserts, and so on.

Under these conditions, it is not inconceivable that an individual might reach for a geoengineering solution. Geoengineering in this context refers to a scheme either to reduce the amount of sunlight (thus, heat) reaching the Earth’s surface, or to pull carbon dioxide from the atmosphere

and sequester it in the Earth’s crust. Geoengineering ideas are tantalizing, in the hope they foster that a technical fix will provide a relatively painless solution to a difficult global problem, but they are untested. Perhaps bouncing sunlight back into space or returning carbon to the Earth’s crust could theoretically avoid a dangerous, even catastrophic, outcome, but other outcomes are also possible. Because many geoengineering schemes are cheap (e.g., spraying the upper atmosphere with reflective particles), there is an expectation that the climate problem could disappear while simultaneously keeping the economy buoyant. Nonetheless, no one yet understands geoengineering’s consequences for the Earth and its many ecosystems. It is possible that the repercussions would be benign, but perhaps they would not.

At some point, climate change’s impacts might begin to overwhelm all efforts at adaptation.

43 For a recent and thorough review of the science related to hurricane frequency and intensity, see “Global Warming and Hurricanes: An Overview of Current Research Results,” National Oceanic and Atmospheric Administration, Geophysical Fluid Dynamics Laboratory, October 30, 2015, <http://www.gfdl.noaa.gov/global-warming-and-hurricanes>.

44 “Global Summary Information - December 2015,” National Oceanic and Atmospheric Administration, <http://www.ncdc.noaa.gov/sotc/summary-info/global/201512>.

45 National Earth System Prediction Capability, <http://espc.oar.noaa.gov/Documents/History.aspx>. The authors thank Sherri Goodman for highlighting this issue.



US Navy aircraft carriers and other vessels at Norfolk naval base, December 2012. Norfolk, Virginia possesses the most intense collection of military installations on Earth. As Norfolk sits at extremely low elevation, it is especially vulnerable to flooding and inundation from sea-level rise. Photo credit: US Navy/Wikimedia.

Those who work closely on the issue believe that some entity or individual—the US government, another state, a billionaire, an entrepreneur—will attempt to geoengineer the planet long before the zero-carbon economy arrives. The decision to attempt a “fix” would become irresistible, but the biggest risk is that the consequences could be both extreme and negative, leading the world down an unknown and dangerous path that might prove even worse than the effects of climate change itself.⁴⁶ For example, if a scheme were to succeed in reflecting sunlight into space, thereby keeping surface temperatures from rising, it would do nothing to prevent the ongoing carbon loading of the atmosphere, which in turn would mean the

ongoing carbon loading of the world’s oceans and their eventual death through acidification.

The scientific community takes an appropriately cautious position on geoengineering. A 2011 survey of scientists by the US General Accounting Office showed that most wanted geoengineering research to proceed, but only under internationally agreed-upon research practices that took geoengineering’s risks seriously. These practices would include interdisciplinary risk assessments, the development of cautionary norms, guidelines for collaborative research, joint research across international boundaries, and processes for evaluating the risks of “deploying” geoengineering schemes before actual deployment. The scientists also articulated a fear that an individual country might attempt a geoengineering scheme without first going through these protocols, thereby representing a new kind of rogue state in the annals of international relations.⁴⁷

⁴⁶ Gernot Wagner and Martin L. Weitzman, “Argument: Playing God,” *Foreign Policy*, October 24, 2012, <http://foreignpolicy.com/2012/10/24/playing-god>; Ross Anderson, “Will Our Grandchildren Say That We Changed the Earth Too Little?,” *Atlantic*, November 5, 2015, <http://www.theatlantic.com/science/archive/2015/11/its-time-to-start-talking-about-geoengineering/414283>; Johann Grolle, “Cheap but Imperfect: Can Geoengineering Slow Climate Change?” *Spiegel Online*, November 20, 2013, <http://www.spiegel.de/international/world/scientist-david-keith-on-slowing-global-warming-with-geoengineering-a-934359-2.html>.

⁴⁷ Center for Science, Technology, and Engineering, *Technology Assessment. Geoengineering: Technical Status, Future Directions, and Potential Responses*, US General Accounting Office, July 2011, pp. v-vii.

RECOMMENDATIONS

This paper offers two recommendations for advancing a climate security agenda. **The first recommendation** consists of a prosaic, but important, initial step: **create a set of scenarios to spell out the security consequences of alternative future climates.** These scenarios would describe and analyze the national security consequences of different climates into the future. They would begin by spelling out the ecological implications of different warming increases—if, for example, global mean temperatures were to increase by one, two, or three degrees Celsius. The scenarios would assess these implications for countries and regions of greatest interest to US national security, and would include an assessment of how different temperature changes would refigure the US homeland itself (e.g., its coastlines, farmland, rivers and watersheds, and cities). To be credible, the scenarios would need to be developed using the best-available scientific projections, starting with global mean temperature increases and extending to other phenomena (e.g., regional temperature increases, effects of temperature and precipitation changes on water and soils).

Once the alternative future climates are drawn, the scenarios could then address the security consequences for the United States and its allies and partners. Would it be possible for the US military to adapt its many installations around the world to the changing conditions outlined in each scenario? In which scenarios would the military have to abandon some of these installations altogether, as is predicted for the Norfolk installations? Would any of the scenarios be so grim as to prevent the Navy, Coast Guard, and other US government agencies and departments from acting as the world's first responders to natural disasters? Under the different scenarios, how would the US military, Department of Homeland Security, and other departments and agencies plan for natural disasters within the United States itself—for example, forest fires, tornadoes, and hurricanes? How would changing precipitation patterns in the Himalayas, the source of many of Asia's major river systems, stress Asia's fragile diplomatic relations—including the India-Pakistan relationship, or China's relationships with its downstream neighbors, including Laos and Vietnam?

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Under the different scenarios, would the United States be forced to rethink its strategies toward the region?

The second recommendation is much broader than the first, and consists of an appeal: the climate security concept needs to become part of a **comprehensive narrative tying climate insecurity to US core national interests.** While climate security is now an established narrative unto itself, discussed among a dedicated set of scholars and practitioners, it remains a narrative that is only partially integrated into the United States' larger public debate about climate change. At times, the relationship between climate change and US national security breaks into mainstream dialogue, but such moments are brief rather than sustained.

There are risks involved in making climate security a central plank within a broader climate change narrative. "Securitization" refers to how problems are redefined using national security logic and framing. The securitization of any problem can be a positive, if it attracts policymakers' attention that it otherwise would not receive. As national security considerations often trump other considerations, successfully redefining a problem as a security challenge often upgrades the amount of attention and resources devoted to addressing it. But securitization also carries significant downsides. One disadvantage includes the risk of overly nationalistic or militarized solutions to problems, which are inherently transnational and that require nonmilitary responses to solve them. A good example is the changing Arctic Ocean, which has important consequences extending far beyond US national security interests, and certainly well beyond US military interests. Defining US Arctic interests through a national security lens would mean privileging certain frames, approaches, and means over others. Halting environmental change in the Arctic may not be on this agenda at all.⁴⁸

Blowback is another serious risk of securitization. Given the politics of climate change in the United States, it

48 Arguments in this paragraph adapted in part from Issie Lapowsky, "How Climate Change Became a National Security Problem," *Wired*, October 20, 2015, <http://www.wired.com/2015/10/how-climate-change-became-a-national-security-problem/>.

is easy to charge that climate security is a distraction that takes attention away from shorter-term, more tangible, and more deserving threats to national security. Indeed, this has already arisen in American domestic politics: in a February 2014 speech given in Jakarta, Indonesia, Secretary of State John Kerry said that climate change “can now be considered another weapon of mass destruction, perhaps the world’s most fearsome weapon of mass destruction.”⁴⁹ This phrase, along with others in the speech, elicited howls of protest in Washington. The administration’s opponents claimed, among other things, that Kerry elevated a diffuse and long-term threat (climate change) to the same status as real, dangerous, and short-term ones like terrorism. In that respect, they charged, he proved to be both naive and incompetent.⁵⁰

Secretary Kerry’s remarks on climate security since the Jakarta speech have differentiated between types of threats: climate change as a long-term but growing threat to US national security versus discrete, tangible threats to national security, such as the Islamic State of Iraq and al-Sham (ISIS). He also points out that climate change might help drive the emergence of groups such as ISIS, but by using indirect pathways—drought in the Syrian case, for example.⁵¹ President Obama has recently made similar arguments about climate security.⁵²

Regardless of any subtle caveats, however, it will be difficult to place climate change firmly within the mainstream debate surrounding US national security. The fact is that more tangible and more kinetic

forms of insecurity will always exist—terrorists will kill innocents, and rogue states will threaten their neighbors—and demand urgent attention.

So how best to work climate security into a US national security agenda? The climate security challenge is **properly framed as a long-term threat to US national security, requiring sustained attention to a fight against a determined and increasingly powerful foe.** Regarding the global security dimension, the threat multiplier concept, in use for years now, remains a proper one to frame climate threats to US interests around the world (e.g., drought is an indirect cause of instability in world regions that are vital to the United States).

But a far more compelling appeal might be to stress climate change’s direct threat to the US homeland—to its landmass, ecosystems, coastlines, farms, cities, and infrastructure. Although Hurricanes Katrina and Sandy only temporarily impacted how Americans thought about and debated climate change, those storms drove home a visceral point on climate insecurity that no rhetoric about threat multipliers could ever induce. The specter of nature’s fury unleashed against the United States and its people might be the stuff of Hollywood blockbusters, but the odds are that real and very serious natural disasters will occur in the United States more frequently in the years to come.

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49 John Kerry, “Remarks on Climate Change,” remarks in Jakarta, Indonesia, February 16, 2014, <http://www.state.gov/secretary/remarks/2014/02/221704.htm>.

50 Aaron Blake, “Post Politics: Gingrich Calls for Kerry to Resign over Climate Change Speech,” *Washington Post*, February 18, 2014, <https://www.washingtonpost.com/news/post-politics/wp/2014/02/18/gingrich-calls-for-kerry-to-resign-over-climate-change-speech/>.

51 Jeff Goodell, “John Kerry on Climate Change: The Fight of Our Time,” *Rolling Stone*, December 1, 2015, <http://www.rollingstone.com/politics/news/john-kerry-on-climate-change-the-fight-of-our-time-20151201>.

52 Barack Obama, “Remarks by President Obama at the First Session of COP21,” November 30, 2015, <https://www.whitehouse.gov/the-press-office/2015/11/30/remarks-president-obama-first-session-cop21>.

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