



2014

How does climate adaptation affect emergency management?

Jonathan W. Gaddy
Calhoun County Emergency Management Agency

Elizabeth Clark
Calhoun County Emergency Management Agency

Jeffrey R. Ryan
Jacksonville State University, jryan@jsu.edu

Follow this and additional works at: https://digitalcommons.jsu.edu/fac_res



Part of the [Emergency and Disaster Management Commons](#)

Recommended Citation

Gaddy, J. W., Clark, E., & Ryan, J. R. (2014). How Does Climate Adaptation Affect Emergency Management? *Journal of Homeland Security & Emergency Management*, 11(2), 243–255. <https://doi.org/10.1515/jhsem-2013-0037>

This Article is brought to you for free and open access by the Faculty Scholarship & Creative Work at JSU Digital Commons. It has been accepted for inclusion in Research, Publications & Creative Work by an authorized administrator of JSU Digital Commons. For more information, please contact digitalcommons@jsu.edu.

Jonathan W. Gaddy, Elizabeth Clark and Jeffrey R. Ryan*

How Does Climate Adaptation Affect Emergency Management?

Abstract: Recent reports from credible research groups suggest that climate change is a reality. The steady rise in extreme weather events over the past decade represents the leading edge of climate change. Climate-induced interactions within and between the natural environment and our human and constructed systems will not only exacerbate existing vulnerabilities but will create new ones. Emergency managers at all levels need to plan and prepare for climate adaptation challenges, which should enable communities to successfully weather the storm. The ability to adapt to the coming changes is dependent upon the actions we take today to create resilience and sustainability. Leaving aside the issue of causation, this paper discusses the implications of climate change for emergency managers by examining predicted impacts, exploring barriers to action, and concluding with strategies for moving forward.

Keywords: climate adaptation; climate change; disaster; disaster risk reduction; emergency management; mitigation; planning; preparedness.

DOI 10.1515/jhsem-2013-0037

1 Introduction

In 1999 – before Katrina, before Sandy, and before sustainability and resilience emerged as key topics in the emergency management profession – Dennis Mileti provided an audience of insurance and risk management professionals with an overview of the paradigm shifts required to address hazards in the 21st century. He said that we must: adopt a *global systems* perspective; *accept responsibility* for hazards and disasters; anticipate ambiguity and change; *reject short-term thinking*; account for social forces; and, embrace *sustainable development* principles [emphasis added] (Mileti 1999: pp. 5, 6). Reminding us that hazard postponement

*Corresponding author: Jeffrey R. Ryan, Jacksonville State University-Emergency Management
100 Gamecock Drive Anniston, AL 36205, USA, Tel.: 2567828334, e-mail: jryan@jsu.edu

Jonathan W. Gaddy: Calhoun County Emergency Management Agency, Jacksonville, AL, USA

Elizabeth Clark: Jacksonville State University-Emergency Management Anniston, AL, USA

should not be mistaken for hazard mitigation, Mileti used the example of flood control levees which provide a false sense of security for residents living in the flood hazard area. In light of New Orleans's experience during Hurricane Katrina 6 years later, this example was seemingly prophetic. To Mileti's point of accepting responsibility for disaster impacts, the UN International Strategy for Disaster Reduction (UNISDR) has a *de facto* motto in "There is no such thing as a 'natural' disaster," a sentiment shared by Bankoff in his opinion to the Harvard International Review: "The sooner we realize that disasters are never natural but always the product of hazard and history, that a people's vulnerability is not a given of place but derivative from the past, the better we are likely to understand what fate might await us all in a world of changing climate" (Bankoff 2010, para. 13; UNISDR 2013). Today, as emergency managers reorient to begin facing the monumental challenges of climate change and adaptation, they should recall Mileti's urging to accept responsibility. Emergency managers in the US must recognize that the human component of disaster phenomena cannot be ignored, stop objectifying disasters – regardless of cause – and the profession of emergency management must stop focusing on hazards and begin focusing on people as drivers of risk – specifically, by adopting the principles that management of risk through vulnerability-informed decision-making is an inherent responsibility of each individual and organization and that disasters are the result of poor or poorly-informed decision-making by those individuals and organizations. In the words of UNISDR contributors, "The recognition that disaster is predominantly an indicator of unsustainable development should be taken as the starting point" (Lavell and Maskrey 2013: p. 17).

2 Implications of Climate Change and Adaptation for Emergency Management

The possible manifestations of climate change and their implications are widely reported, and they will impact the human and built environments by affecting settlement patterns, political and economic development, health, security, and infrastructure. The IPCC categorizes these impacts into two groups: fast or "extreme weather events," such as hurricanes and flash floods; and "slow onset" events, such as sea level rise and decreased access to freshwater resources (IPCC 2012: p. 39). For North America, the Intergovernmental Panel on Climate Change (IPCC) lists some of the major projected extremes including increases in heat wave frequency and duration, increases in drought and wildfires, increased inland flooding, and increases in coastal storms and related

flooding. These could be exacerbated by slow onset events such as sea level rise (in turn increasing coastal storm surge hazards) and increased desertification (forcing migration of people and resulting in new development and associated hazard challenges).

Considering the impact of mitigation actions as part of climate adaptation, a 2012 technical paper stemming from work at the IPCC raises the same warning as Mileti did in 1999: “The possibility of “maladaptation” and other unintended consequences may become apparent through ongoing monitoring. Although selected strategies may reduce risk in the short term, they may increase exposure and vulnerability over the longer term. For example, dike systems can reduce flood exposure by offering immediate protection, but may also encourage settlement patterns that reduce resilience and increase risk in the long term” (UNFCCC Secretariat 2012: p. 30). The risk issues surrounding mitigation not only arise in the context of natural hazards but are also implicit in mitigating technological hazards. A 2012 report prepared for United Nations humanitarian organizations on the implications of climate change on environmental emergencies notes that development activities in response to climate change can themselves give rise to potential consequences: “... an increased emphasis on producing biofuels or carbon capture and storage facilities means that more industrial plants will likely be constructed, including in urban areas. Those constructing such plants should consider the potential effects of climate change and urbanization trends on facility safety, so as to reduce their vulnerability to accidents and secondary effects of extreme weather events” (Bruch and Goldman 2012: p. 10).

There are implications for homeland security, too, in terms of climate impacts on technological risks, political stability, and security. The potential for increased competition for resources – water and food in particular – has been highlighted as a stressor that could influence conflicts and security in the future, to the extent that there are advocates for addressing climate change in terms of international law as a “threat to peace and security” (Matthee 2011: p. 7). The World Bank’s 2010 *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World* provides a good overview of these concerns (The World Bank 2010: p. 82). Citing the US National Security Strategy’s assertion that “The danger from climate change is real, urgent, and severe,” the US Department of Homeland Security’s *Climate Change Adaptation Roadmap*, released in 2012, identifies climate change as both a “threat multiplier” and a “strategic driver” and extensively discusses DHS’s perceived operational and strategic vulnerabilities to climate change (US DHS 2012: pp. iv, 2). Considering the potential accumulation of new risk from both existing and unknown hazards – and the corresponding potential for indirect and secondary risk effects – a shift from focusing on possible hazards to focusing on existing vulnerability and risk drivers would help to reduce unknowns for emergency managers.

3 Paradigm Shift to Disaster Risk Reduction

The relationship between climate change, disasters, and development has been called “an undeniable unholy alliance” that presents unique challenges for both policy makers and disaster professionals (Prabhakar et al. 2009: p. 2). Since climate change and climate adaptation are global issues that must be addressed globally – and since emergency managers will doubtless be working to varying degrees with other stakeholders to address them – it follows logically that some globalization of emergency management must occur. The apparent alternative to a traditional hazard-centric emergency management model in the global arena is that of disaster risk reduction. Addressing the global issues of climate change and adaptation will force the people-centric philosophy of disaster risk reduction issue into the limelight for US emergency managers by affording a convenient tool to analyze existing gaps in the hazard-centric model currently used by emergency managers.

The UNISDR defines disaster risk reduction (DRR) as “The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events” (UNISDR 2009: p. 10). The difference between disaster risk reduction and traditional disaster management is a shift from reactive focus on hazards and response (akin to treating the symptoms) to a proactive focus on vulnerability and risk management (akin to treating the disease): “At the core of this paradigm shift is the recognition that effectively addressing the issue of disaster-related losses requires DRR to be considered as a development issue. Its underlying values are that development should not engender vulnerability, and that development provides an opportunity to reduce vulnerability as well as the frequency of hazardous events” (UNFCCC 2008: p. 11). On the other hand, there is thought that too much cross-pollination between disaster risk reduction and development could hinder efforts in either or both arenas; again, the danger here lies in focusing on hazards without appreciating that “disasters are not politically neutral” (Manyena 2012). To be effective, disaster risk reduction must be incorporated across the spectrum of development decision-making, not merely included as a sidebar objective.

Ongoing discussions surrounding the evolution of the ISDR framework observe that the fundamental challenge alluded to in this paper’s introduction – that disasters are conceptualized as unpreventable and purely negative events – is very much an international concern: “Disasters are still predominantly seen as exogenous and unforeseen shocks that affect supposedly normally functioning

economic systems and societies rather than as endogenous indicators of failed or skewed development, of unsustainable economic and social processes and of ill-adapted societies” – since “the very concept of disaster risk reduction points to addressing risks that already exist,” DRR resources and effort accrue within the existing emergency and disaster management arenas and become increasingly isolated from other sectors and society at large (Lavell and Maskrey 2013: pp. 7, 6). These observers argue that, in order to avoid compartmentalization and objectification of disaster risk issues, we should focus not on the negative things that disaster risk reduction will help us to avoid but rather on the positive things disaster risk reduction will help us achieve.

4 Current State and Federal Activities in the US

In November 2013, Columbia Law School’s Center for Climate Change Law released a survey of state hazard mitigation plans that examines correlations between climate-related hazards identified in the US National Climate Assessment and states’ hazard assessment and mitigation strategies (Babcock 2013). The survey shows that the US is inadequately addressing climate change and climate adaptation in current state hazard mitigation planning efforts. The author characterizes 11 of the 50 plans surveyed as “thorough” in discussing climate change and adaptation; however, 18 states’ plans either contained inaccurate information on climate change or ignored the issue altogether. The survey concludes that the lack of federal (FEMA) guidance on how to address climate change in state hazard mitigation plans could be a contributing factor to the inconsistency observed in states’ plans.

The federal level is more active, with US President Barack Obama’s November 2013 issuance of an Executive Order entitled “Preparing the US for the Impacts of Climate Change” (Exec. Order 2013). The Order creates a Council on Climate Preparedness and Resilience to bring together federal agencies to address climate issues in addition to laying out some specific climate-related objectives for the federal government as a whole. The order also creates a complementary task force of state, local, and tribal leaders to advise and participate in the process. The new Council will benefit from federal agency climate change adaptation plans required since 2009 and incorporated into federal agencies’ overall Strategic Sustainability Performance Plans for the first time in 2013 (Exec. Order 13514 2009: p. 8; Council on Environmental Quality 2013, para. 3).

A cursory review of the 2013 strategic sustainability plans submitted by some of the key federal agencies traditionally involved in emergency management

activities¹ reveals that only the Departments of Defense and State mentioned the term “disaster risk reduction” in their plans, although resilience is addressed by all the plans reviewed in the context of climate adaptation – climate resilience being distinct from but related to disaster resilience – as this was a required point of consideration (Exec. Order 13514 2009; Performance.gov 2013). Of the plans reviewed, the previously mentioned DHS’s *Climate Change Adaptation Roadmap*, a self-contained appendix to the agency’s overall Strategic Sustainability Performance Plan, contains the most extensive discussion of disaster-related issues stemming from climate change and adaptation.

5 Resilience, Adaptation, and Risk Reduction

The US *Interagency Climate Change Adaptation Task Force 2011 Progress Report* briefly mentions disaster risk reduction as distinct from “preparedness and response support” but does not elaborate; however, the report speaks at length to resilience as a goal of climate adaptation activities (Interagency Climate Change Adaptation Task Force 2011: p. 1). The concepts of disaster resilience and climate change resilience are related but not identical. In a whitepaper entitled “Building Climate Change Resilience,” the Rockefeller Foundation defines climate change resilience as “the ability to survive and recover from the effects of climate change” in order to continue functioning at an acceptable level, and goes on to define the term adaptation as “the individual actions required to respond to climate change activities required in order to achieve resilience” (Rockefeller Foundation 2009: p. 1). The whitepaper contrasts the IPCC’s definition of adaptation as “an adjustment in natural or human systems” with resilience by pointing out that resilience “refers to the capacity over time of a system, organization, community, or individual to create, alter, and implement *multiple* adaptive actions [emphasis in the original].” It is appropriate here to contrast this definition of climate change resilience with the definition of disaster resilience as put forth by the UNISDR: “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” (UNISDR 2009: p. 22). Emergency managers in the US should have a clear understanding of how these terms are different and similar as

¹ Plans reviewed: US Departments of Agriculture, Commerce, Defense, Energy, Environmental Protection Agency, Health and Human Services, Homeland Security, Housing and Urban Development, State, and Transportation.

well as what their use may indicate about an agency or entity's actions and plans to achieve disaster risk reduction goals.

In his *FEMA Administrator's Intent (FY2015–2019)* memorandum to employees, current FEMA Administrator W. Craig Fugate listed “Enable disaster risk reduction nationally” as one of his top five priorities through the end of the decade (Fugate 2013: p. 4). Fugate's assertion that “The growing interconnectiveness of our world, technological interdependencies, economic vulnerabilities, and changes in the climate underscore the need for improved and more active management of the risk environment nationally” echoes some of the same long-standing challenges as those identified by Mileti in 1999 and should resonate with emergency managers across the US today. In directing FEMA “to enable and facilitate greater disaster risk reduction at all levels nationally, thereby enhancing our resilience to disasters ... [and] provide analysis, tools, and information that support choices that guide individuals, communities, and national decisions toward reducing disaster risk,” Fugate is setting the stage for more and deeper discussions about how disaster risk reduction – an international concept – will influence emergency management in the US. On the climate issue in particular, Fugate goes a step further and defines the role FEMA will play in adaptation efforts by directing the agency to “foster and support adaptation in the face of a changing climate” in its programs by emphasizing the importance of information sharing and leveraging FEMA's mitigation and insurance programs to help achieve risk reduction. In light of the Administrator Fugate's commitments, it is significant to note that the US DHS's *Roadmap* for climate change speaks to disaster resilience throughout but does not include the term “disaster risk reduction” (US DHS 2012). This would seem to imply, in light of the absence of DRR terminology from the other federal agency strategic planning material reviewed for this paper, that FEMA has a long way to go in terms of educating its parent agency and other federal partners about the philosophy of disaster risk reduction and its potential role in addressing climate change and the concept of “climate change resilience” that was adopted as a national goal in *The President's Climate Action Plan* released in June, 2013 (Executive Office of the President 2013: p. 16).

6 Suggestions for Enabling Disaster Risk Reduction in the US

In the context of disaster risk reduction, emergency managers find a crucial and familiar role in “managing residual risk, recognizing that risks can never be totally eliminated” (IPCC 2012: p. 341). FEMA Administrator Fugate echoes this

line of thought in his *Administrator's Intent*, stating that “We recognize that risk cannot be totally eliminated, and that FEMA cannot achieve meaningful national risk reduction on its own, but we can do more to influence and support these outcomes” (Fugate 2013: p. 4).

To capitalize on disaster risk reduction concepts, emergency management and homeland security professionals in the US must shift their focus from managing hazards to managing vulnerability. This shift will result in changing conceptualizations of risk in terms of causation, location, and management strategy. A first step in this direction could involve changing how the two professions consider hazards and impacts by using a people-centric approach: focus on *what* the vulnerabilities and potential impacts are, rather than *why* the impacts occur (hazards); identify *when* impacts might become manifest at any place (highlighting increasing global connectedness and cascading effects), rather than *where* they will begin; and, ask *who* in the whole community will be responsible for addressing the vulnerabilities, instead of introspectively (to the profession) trying to enumerate options of *how* they can be addressed that must then be sold to a broader audience of stakeholders and decision-makers. Some examples of how these questions might be used to refocus decision-making from centering on hazards to centering on reducing human-caused vulnerability are presented in Table 1.

Recalling Fugate's assertion that FEMA cannot independently accomplish disaster risk reduction, emergency managers should advocate for an integrated approach to engagement that is supported through empowerment and education across all sectors of society and levels of government. As observed in Lavell and Maskrey, education is the foundation for achieving disaster risk reduction, in that prevention and risk reduction must be incorporated into prevailing cultural norms as a proactive and intrinsic part of decision-making in our society rather than be relegated to a separate “culture of prevention” that both embodies and necessitates the existing detached emergency management enterprise. FEMA's 2013 *National Strategy Recommendations: Future Disaster Preparedness* report to Congress specifically addresses the critical educational component of the agency's initiative to support disaster risk reduction and proposes that future efforts “Include suggested interventions across the education spectrum to raise individual and community awareness of actions that can reduce disaster costs, injuries, and loss of life” (FEMA 2013: p. 17). Once an awareness of disaster risk reduction principles and vulnerability-based decision-making is cultivated, stakeholders across all sectors should seek empowerment to implement risk reduction in daily decision-making and development activities. To this point, the federal *Climate Action Plan* and departmental incorporation of climate adaptation and resilience into strategic planning may provide a useful template for action. By embracing

Table 1 Derived from: IPCC 2012; Lavell and Maskrey 2013; and UNFCCC 2008

Conceptualization of Risk	Traditional EM/HS Focus	Focus shifted toward DRR
Risk Causation: Hazard vs. Vulnerability	<p><i>Why</i> will the event occur?</p> <ul style="list-style-type: none"> – Focuses on hazards as causal agents of risk. – Manages hazards through preparedness, protection, and mitigation in the human-human and human-nature interfaces. 	<p><i>What</i> about human society makes us vulnerable to hazards?</p> <ul style="list-style-type: none"> – Focuses on humans as the causal agents of risk. Hazards do not cause vulnerability – humans do. – Manages hazards through reducing vulnerability.
Risk Location: Spatial vs. Temporal	<p><i>Where</i> will the event occur?</p> <ul style="list-style-type: none"> – Focuses on immediate and short-term hazards as perceived for a specific locality. – Perceives hazards that are geographically remote as less significant, leaving some aspects of vulnerability unexamined. 	<p><i>When</i> will vulnerabilities be impacted?</p> <ul style="list-style-type: none"> – Focuses on global connectedness and recognizes that, through cascading effects, an event anywhere in the world can impact localities distant from the event itself. – Perceives vulnerability through the lens of interdependent systems (human environment, natural environment, and built environment).
Risk Management Strategy: Mechanics vs. Responsibility	<p><i>How</i> can event risks be avoided, lessened, or transferred?</p> <ul style="list-style-type: none"> – Focuses on traditional hazard mitigation and increasingly complex response and recovery systems. – Top-down technocratic approach can result in distribution of loss burden across both affected and unaffected populations and marginalization of risk management as an independent enterprise. 	<p><i>Who</i> is responsible for reducing vulnerability?</p> <ul style="list-style-type: none"> – Focuses on capacity building at all levels to increase resilience. – Responsibility for making vulnerability-informed decisions is both horizontal across all sectors (public and private) as well as vertical (local, state, federal)

risk reduction as a common priority rather than the exclusive domain of the emergency management enterprise, federal agencies and departments could begin to reduce vulnerability through their diverse platform of programs and activities. Some key opportunities in this regard are public education, transportation and utilities infrastructure maintenance and development, and urban planning programs. The desired end-state of this three-step process – education, empowerment, and engagement – would be the involvement of all elements of society in an ongoing and proactive program of disaster risk reduction executed through the lens of reducing vulnerability in order to sustain development, achieve resilience, and enhance quality of life.

7 Conclusion

A disaster, viewed from the systems perspective, is a function of the human component's interactions with the physical and built environments. Since a disaster cannot occur without the human component, efforts to prevent and mitigate future disasters should necessarily focus on reducing vulnerabilities in the human and built environments rather than focusing solely on hazards. Continuing climate change is expected to have a number of impacts on populations around the world, requiring emergency managers in the US to engage on issues of mitigation and climate adaptation. As discussions on climate change highlight the global interconnectedness of human, built, and natural systems, emergency managers should pause to survey and learn from the vast body of knowledge being developed internationally to support disaster risk reduction.

Disaster risk reduction essentially focuses on the management of causes rather than effects. In front-loading prevention as a key strategy to manage risk, disaster risk reduction interfaces tightly with the concept of sustainable development. However, disaster risk reduction, like emergency management, suffers from being set apart as a priority in-and-of itself and the resulting compartmentalization and isolation of its programs and initiatives. The federal government has taken a lead role in addressing climate change and adaptation efforts in the US, but only a few states have begun incorporating climate change issues into hazard mitigation planning efforts. There is also a disconnect between the concepts of climate resilience and disaster resilience, pointing to the absence of a common underlying strategy for reducing vulnerability through disaster risk reduction. Although FEMA has adopted disaster risk reduction as a strategic priority, only a handful of other federal agencies have incorporated “disaster risk reduction” terminology into their strategic planning efforts.

In order to benefit from disaster risk reduction principles, emergency managers in the US should pursue a three-step process of education, empowerment, and engagement. Reframing traditional views of hazards to a more people-centric conceptualization of vulnerability will help to increase integration of risk reduction across all sectors while simultaneously alleviating the debilitating compartmentalization of the existing emergency management enterprise. Using lessons learned from international disaster risk reduction efforts and the recent example of federal climate change action planning, practitioners in the US can begin to build foundations for evolution into a society of risk-informed decision-makers that works collectively and collaboratively to reduce vulnerability.

As a final note, the authors wish to clarify that, although there are many commonalities and opportunities for improvement through knowledge sharing and comparison, they do not advocate a blind adoption of disaster risk reduction principles as advocated by the ISDR by emergency managers in the US. The shift of emergency management from a standalone enterprise to a more integrated system that spreads responsibility across the whole community is a positive evolution that will assist integration of disaster risk reduction as a common and foundational goal. Most importantly, the authors wish to impart to readers that the issues raised in Lavell and Maskrey, 2013, regarding the challenges being faced in the efforts of disaster risk reduction are very relevant to the emergency management profession and to encourage future discussion, research, and dialogue on this topic.

References

- Babcock, M. (2013). *State Hazard Mitigation Plans & Climate Change: Rating the States*. Columbia Law School, Center for Climate Change Law, New York. Retrieved from http://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/Students/SHMP%20Survey_Final.pdf (accessed January 20, 2014).
- Bankoff, G. (2010). No Such Thing as Natural Disasters. *Harvard International Review, Web Feature*. Retrieved from <http://hir.harvard.edu/no-such-thing-as-natural-disasters> (accessed January 20, 2014).
- Bruch, C. and L. Goldman (2012). *Keeping Up with Megatrends: The Implications of Climate Change and Urbanization for Environmental Emergency Preparedness and Response*. Office for the Coordination of Humanitarian Affairs, Joint UNEP/OCHA Environment Unit, Emergency Services Branch, Geneva, Switzerland. Retrieved from <https://docs.unocha.org/sites/dms/Documents/Keeping%20up%20with%20Megatrends.pdf> (accessed January 19, 2014).
- Council on Environmental Quality. (2013). *Obama Administration Releases Federal Agency Strategic Sustainability Performance Plans*. Washington, DC: The White House. Retrieved from http://www.whitehouse.gov/administration/eop/ceq/Press_Releases/February_07_2013 (accessed January 19, 2014).

- Exec. Order 13514. (2009). *Federal Leadership in Environmental, Energy, and Economic Performance*.
- Exec. Order. (2013). Preparing the United States for the Impacts of Climate Change. Retrieved from <http://www.whitehouse.gov/the-press-office/2013/11/01/executive-order-preparing-united-states-impacts-climate-change> (accessed December 15, 2013).
- Executive Office of the President. (2013). *The President's Climate Action Plan*. Washington, DC: The White House. Retrieved from <http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf> (accessed January 20, 2014).
- FEMA. (2013). *National Strategy Recommendations: Future Disaster Preparedness, Fiscal Year 2013 Report to Congress*. Washington, DC: DHS/FEMA. Retrieved from <http://www.fema.gov/media-library/assets/documents/35064> (accessed January 19, 2014).
- Fugate, W. C. (2013). *FEMA Administrator's Intent (FY2015–2019)*. US Department of Homeland Security, Federal Emergency Management Agency, Washington, DC. Retrieved from http://www.fema.gov/media-library-data/20130726-1911-25045-4786/2015_2019_administrator_s_intent_final508.pdf (accessed December 15, 2013).
- Interagency Climate Change Adaptation Task Force. (2011). *Federal Actions for a Resilient Nation*. Washington, DC: Interagency Climate Change Adaptation Task Force. Retrieved from http://www.whitehouse.gov/sites/default/files/microsites/ceq/2011_adaptation_progress_report.pdf (accessed January 19, 2014).
- IPCC. (2012). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. Intergovernmental Panel on Climate Change. New York: Cambridge University Press. Retrieved from https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf. (accessed January 20, 2014)
- Lavell, A. and A. Maskrey (2013). *The Future of Disaster Risk Management: An On-Going Discussion*. UNISDR. Retrieved from <http://www.unisdr.org/we/inform/publications/35715> (accessed December 15, 2013).
- Manyena, S. B. (2012) “Disaster and Development Paradigms: Too Close for Comfort?,” *Development Policy Review*, 30(3): 327–345.
- Matthee, M. (2011) “The Hauge, Netherlands: Netherlands National Commission for UNESCO.” In: (M. van der Valk and P. Keenan, eds.) *Climate Change, Water Stress, Conflict and Migration*. Retrieved from http://unesco.nl/sites/default/files/dossier/climate_change_water_stress_conflict_and_migration_0.pdf (accessed December 2, 2013).
- Mileti, D. (1999) “Disasters by Design.” In: (N. R. Britton, ed.) *The Changing Risk Landscape: Implications for Insurance Risk Management*. Washington, DC: Aon Group Australia Limited. Retrieved from http://www.aonline-aon.com/public/intelligence/disasters_by_design.pdf (accessed December 14, 2013).
- Performance.gov. (2013). *Sustainability*. Retrieved from Performance.gov: <http://sustainability.performance.gov/> (accessed January 20, 2014).
- Prabhakar, S. V., A. Srinivasan and R. Shaw (2009). “Climate Change and Local Level Disaster Risk Reduction Planning: Need, Opportunities and Challenges,” *Mitigation and Adaptation Strategies for Global Change*, 14(1):7–33.
- Rockefeller Foundation. (2009). *Building Climate Change Resilience White Paper*. Rockefeller Foundation. Retrieved from <http://www.rockefellerfoundation.org/uploads/files/c9725eb2-b76e-42eb-82db-c5672a43a097-climate.pdf> (accessed January 19, 2014).
- The World Bank. (2010). *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World*. (R. Mearns and A. Norton, eds.) Washington, DC: The International Bank for Reconstruction and Development/The World Bank.

- UNFCCC. (2008). *Integrating Practices, Tools and Systems for Climate Risk Assessment and Management and Strategies for Disaster Risk Reduction into National Policies and Programmes*. Technical Paper, UNFCCC. Retrieved from <http://unfccc.int/resource/docs/2008/tp/04.pdf> (accessed January 19, 2014).
- UNFCCC Secretariat. (2012). *Slow Onset Events*. United Nations Office at Geneva. Retrieved from <http://unfccc.int/resource/docs/2012/tp/07.pdf> (accessed January 20, 2014).
- UNISDR. (2009). *UNISDR Terminology on Disaster Risk Reduction*. Geneva, Switzerland: United Nations International Strategy for Disaster Reduction (UNISDR). Retrieved from United Nations Office for Disaster Risk Reduction: http://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf (accessed December 20, 2013).
- UNISDR. (2013). *What is Disaster Risk Reduction?* Retrieved from UNISDR/Who We Are/What Is Disaster Risk Reduction?: <http://www.unisdr.org/who-we-are/what-is-drr> (accessed December 14, 2013).
- US DHS. (2012). *Climate Change Adaptation Roadmap*. Washington, DC: US Department of Homeland Security. Retrieved from http://www.dhs.gov/sites/default/files/publications/Appendix%20A%20DHS%20FY2012%20Climate%20Change%20Adaptation%20Plan_0.pdf (accessed January 19, 2014).