

Proposal 2: Reforming Federal Support for Risky Development

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Deficit Reduction (10-year): \$40 billion

Broader Benefits: Reduces budget costs of natural disasters; reduces risks to life and property of Americans living in disaster-prone areas.

Introduction

Within the past decade, citizens of the United States have experienced a series of devastating natural disasters, including Hurricanes Sandy, Katrina, and Rita; the tornado outbreaks of 2011 and 2012; and an annual slew of increasingly destructive wildfires. These disasters have exerted a significant human toll, destroying homes, uprooting families, and bankrupting local businesses. The devastation caused by these disasters has increased substantially in recent years, and unfortunately the forecast does not predict a respite: most climate experts and economists expect that the United States will continue to experience escalating damages from natural hazards such as severe weather, floods, and wildfires.

As these tragedies have proven time and again, Americans are generous in times of disaster. We have seen communities come together as neighbors help one another recover and rebuild, and we have witnessed outpourings of support and charitable contributions from concerned citizens across the country. Considerable amounts of federal aid are also often sent to areas affected by natural catastrophes, and the federal government insures many Americans living in flood-prone regions through the National Flood Insurance Program (NFIP), which was created in 1968 as an agreement between the federal government and local communities, wherein the federal government makes flood insurance available to residents of communities that adopt and enforce a floodplain-management ordinance. Through such relief efforts and

programs, the federal government plays an important role in insuring losses incurred in disasters and in reducing the costs and harms of future disasters.

The increasing frequency, intensity, and costs of disasters have placed tremendous budgetary pressure on the institutions intended to avert and mitigate disasters and to provide relief to disaster victims. Because federal taxpayers often cover much of the bill for the damages of a natural disaster, individuals, developers, and local governments can face incentives to develop and redevelop areas that are at risk for natural disasters. The first step in reforming federal disaster support is for policymakers to reduce unnecessary damage caused by human occupancy of at-risk areas. We believe the federal government should continue to play a strong role providing much-needed assistance to Americans who are the victims of natural disasters, but that the federal role should also require and incentivize steps to ensure that residents and communities make decisions and undertake investments to mitigate future losses.

The federal government neither does nor should dictate where people can live, own property, or operate their businesses. The federal government can, however, rethink and reform its appropriated and nonappropriated support for development activities and postevent reconstruction to support and nurture better zoning regulations, building codes, and natural-hazards management programs, to help ensure that individuals avoid especially hazardous locations.

To make the federal government's disaster-relief efforts more effective, from both environmental and economic perspectives, we propose a series of reforms that fall into three broad categories:

1. Incentivize and otherwise implement higher disaster-resistant development standards for any type of federal support for new or reconstructed public and private housing, industry, and infrastructure investments.
2. Require greater private and local cost-sharing of disaster costs.
3. Further reform the NFIP.

Natural disasters are, by their nature, unpredictable, and this makes calculating the fiscal effects of our proposals difficult, but our conservative estimate is that our reforms would save the federal government at least \$40 billion over the next ten years. In addition, these proposals will promote a safer, less-disaster-prone future, and will mitigate potential harm to those that choose to remain in areas that Mother Nature regularly visits with wildfires, earthquakes, storms, and floods.

The Challenge

THE ECONOMIC COSTS OF NATURAL DISASTERS

The costs of rebuilding from repeated disasters—especially floods, which are the United States' most frequent and costly natural disaster—go well beyond the repair of individual structures. In addition to the human costs of natural disasters, there are costs to local governments from responding to crisis situations and later repairs to roads, bridges, and other infrastructure. There also are costs to volunteer agencies; to private organizations; and to insurance companies, as well as to their premium payers. Damage to fragile river and coastal ecosystems cannot be fully quantified. That damage affects not only critical habitats, but also the natural flood-protection capacity and capability of these ecosystems to provide initial barriers against the next severe weather event. In June 2005, the National Science Technical Council (NSTC) reported that the cost of disasters to the nation, including emergency response, public and private property damages, and business disruption, had already reached \$1 billion a week (NSTC 2005, 3).

Cummins, Suher, and Zanjani note, “[D]evelopment has been steadily increasing in catastrophe-prone areas, so the property at risk is far greater now than at any time in the past . . . and the combination of rising standards for federal assistance and the growing private exposure suggests that the ‘stealth entitlement’ of federal disaster assistance has grown large enough to merit a deeper assessment” (2010, 1). They also

demonstrate that, given recent trends, a net present value of unfunded liability in disaster assistance over the next seventy-five years could be between \$1 trillion and \$5.7 trillion, comparable to the projected shortfall in the Social Security system (\$4.9 trillion) over the same period (Cummins et al. 2010, forthcoming).

One needs only view the breadth and cost of responses to Hurricanes Katrina, Rita, and Wilma in 2005, and the recent Hurricane Sandy Emergency Supplemental Appropriation to realize the growing costs of federal disaster management. From 1989 to 2011, Congress provided a total of \$292 billion (2010 dollars) in federal disaster assistance through thirty-five separate appropriations acts. Most of those funds were appropriated toward the end of that window: between 2005 and 2010, Congress appropriated \$163 billion, the vast majority of which went to Hurricane Katrina relief, with major funds allocated for programs of thirteen separate federal departments and seven independent agencies (Congressional Research Service [CRS] 2011).

With increasing frequency, the federal government has been waiving state and local cost-sharing for Stafford Act Disaster Assistance, which provides emergency aid to state and local governments, and major Corps of Engineers building programs, thus bringing the federal burden of the government costs of these natural disasters to 100 percent. Much of the funding supported rebuilding at lower, riskier elevation levels than the original structures, and often only paid lip service to enforcing Jimmy Carter's 1977 Executive Order 11988, which directed that critical facilities and infrastructure be located outside or elevated above five-hundred-year flood levels (that is, levels only observed in the most extreme of floods). Much of the Katrina relief funds, for example, were provided without serious requirements to mitigate likely risk from future catastrophes.

In the two Hurricane Sandy emergency supplemental bills, a combined total of just over \$60 billion was provided for programs of ten federal departments and seven independent agencies. Again, most of the Sandy legislation constituted spending to repair federal facilities and provide grants to communities for repairs, while only weakly referring to long-term recovery, with few or no tangible directed standards to ensure significant future hazard mitigation. Interestingly, as the bills were being passed, the governors of New York and New Jersey, and Mayor Bloomberg of New York City, announced new state and local policies and plans that give some in the disaster-mitigation community hope for emphasis on stronger rebuilding standards and use of voluntary buyouts and permanent evacuation of some of the highest-risk and damaged areas. The actual outcomes of these plans remain to be seen.

THE PROBLEM OF CLIMATE CHANGE

Part of the driving force behind the increase in federal disaster spending is climate change and its associated increases in the frequency and costs of natural disasters. The nation's climate scientists continue to warn of damage from climate change, caused by increasing storm intensities, rising sea-levels, and other factors. The recent draft National Climate Assessment currently under public review, for instance, finds that since 1992 the rates of sea-level rise have doubled over rates of the previous century. Current projections forecast one to four feet of sea-level rise over the next hundred years, which is especially disconcerting, because nearly 5 million Americans live within four feet of elevation of their local high-tide levels (National Climate Assessment and Development Advisory Committee [NCADAC] 2013, 4–10). Another study conducted for the Federal Emergency Management Agency (FEMA) projects that, due to both population increases and climate changes, flow volumes of major floods would likely increase "as much as 50 to 60 percent relative to present day values in areas of the Pacific Northwest, urbanized areas of the West and areas of the Northeast" by the end of the century, with substantial increases in many regions in the next few decades (Kolat et al. 2012, 451). These predictions portend considerably expanded floodplains across the nation with more-frequent damaging floods.

MORAL HAZARD AND THE FEDERAL ROLE IN DISASTER RESPONSE

Gilbert White famously observed, "Floods are acts of God, but flood losses are largely acts of man." That observation is very much supported by the United Nations' 2009 Global Assessment Report on Disaster Risk Reduction, which indicates that worldwide losses from natural disasters are increasing, as more and more people occupy disaster-prone locations. New research suggests that the United States should expect huge increases in disaster spending due to current land-use practices, irrespective of any additional toll that will be caused by climate change, land subsidence, and sea-level rise (Thomas and Bowen 2009).

The economic concept of moral hazard helps explain why risky areas are being developed in the first place, and then rebuilt in the same manner following a natural disaster. Moral hazard arises when one party takes on risk knowing that the costs that could result would be borne by another party. In the case of natural disasters, individuals are more likely to develop at-risk areas if they know that they will not bear most of the costs should that area be struck by a catastrophe.

This concept also explains why local governments do not adopt more-stringent zoning codes for preventing the development of at-risk areas. Water views and water rights make some properties more attractive and more valuable,

despite being more vulnerable to floods. This benefits the local economy through higher real estate and other taxes and from enhanced economic activity. This makes the development of these floodplain areas attractive from the perspective of local authorities, who are also charged with adopting and enforcing zoning and building codes in those hazardous locations.

Because the federal government is bearing an increasingly large share of the financial burden for natural disasters, this exacerbates the moral hazard that encourages building in at-risk zones: if developers and local authorities know the federal government will pay most of the costs for a disaster, there is even less incentive to avoid development in risky areas. This trend toward increasing federal assumption of disaster costs, in both total cost and in relative proportions, is new; a few decades ago, the costs of natural disasters were largely borne by state and local governments and victims (or their insurers), generally without large federal-level expenditures (Moss 1999, 2002). In the fifteen years before Hurricane Katrina, the federal government bore, on average, 26 percent of the costs of major hurricanes, but since 2005 the federal government has paid almost 70 percent of the costs (Abel et al. 2012). These costs are passed on to the taxpayers through a cornucopia of federal programs, ranging from direct payments through FEMA, the Department of Housing and Urban Development, and the Department of Agriculture, to Small Business Administration loans, to tax benefits from deductions for casualty losses (Thomas et al. 2011).

This means that poorly designed, engineered, constructed, and sited development continues on high flood-risk properties, especially in coastal areas and other flood-prone locations, and that the federal government is responsible for a sizable share of potential losses that result in the event of disaster.

The Proposal

MITIGATING FUTURE DISASTERS

The escalating threat of natural disasters requires actions that will reduce the costs of these hazards as well as reforms that make more-efficient use of federal relief funds. Among the most beneficial and reliable savings are those that result from reducing or eliminating subsidies for government hazard insurance to better internalize costs for the highest-risk properties, and those from developing and implementing more-effective hazard-mitigation standards through federal investments and economic assistance. This section provides several specific areas for improvement.

Lower the premium subsidy for crop insurance

The federal government currently provides a 60 percent taxpayer subsidy to purchase federal crop insurance. This provides incentives to grow crops in marginal, high-hazard locations that would otherwise be too risky. Last year, a combination of record crop prices, increased use of insurance, major drought and flood conditions, and a lack of conservation compliance requirements led to record crop insurance costs of \$13 billion (Sumner and Zulof 2012). Lowering the premium subsidy for crop insurance and requiring conservation-compliance regulation that prohibits cropping in wetlands and other highly erodible soil areas could result in major savings for the nation. According to the Government Accountability Office (GAO), the savings could amount to \$1 billion annually, potentially more with even higher standards (GAO 2012). In addition, the Congressional Budget Office (CBO) estimates that reducing the crop insurance premium subsidy from 60 percent to 50 percent would save more than \$5 billion over the next five years, and almost \$12 billion over the next ten (CBO 2011).

Eliminate subsidies for risky development

Another way to prevent unnecessary disaster costs is to eliminate subsidies that support the development or redevelopment of areas that are at-risk for flooding or other disasters. Taxpayers currently subsidize such risky development through federal grants for infrastructure projects in at-risk areas, through Stafford Act loans and grants, and through the tax system through real estate-tax and mortgage-interest deductions, and deductions for casualty losses. Further, the federal government also frequently assumes the costs of uninsured private losses in the wake of catastrophe, providing implicit insurance in case of loss. Some progress has already been made in reducing these federal subsidies. The Coastal Barrier Resources Act of 1982 (CBRA), for instance, eliminated federal subsidies, including federal flood insurance and infrastructure funding, for undeveloped areas within the nation's approximately three hundred coastal barrier islands and nearby low-lying land areas along the Atlantic and Gulf Coasts, and around the Great Lakes. While such treatment has not halted new at-risk development on all barrier islands, such development has considerably slowed, especially where state and local cooperation exists. A Department of the Interior (2002) study conservatively estimated nearly \$1.3 billion in federal budget savings from 1983 to 2000, largely through reduced infrastructure and disaster-assistance costs from the CBRA. Expanding the zones included in the CBRA domain—especially undeveloped areas and high-risk, developed areas that are likely to be permanently inundated by sea-level rise within just a few decades—would slow risky development in disaster-prone areas, resulting in greater future savings.

Invest in Pre-Disaster Mitigation and other similar projects

Federal funds that provide incentives for local governments to take on hazard mitigation would more than pay for themselves through future savings. For example, FEMA's Pre-Disaster Mitigation program provides grants to help communities engage in projects that can lessen casualties and property damage from earthquakes, floods, hurricanes, and other natural hazards. Pre-Disaster Mitigation–funded projects from 2004 to mid-June 2008 cost nearly \$500 million, but CBO estimates that the reduction in future losses associated with those projects has a present value of \$1.6 billion, for an overall benefit-to-cost ratio of three to one (CBO 2007).

The growing risk of flood- and storm-related damages requires stronger executive direction for managing these risks. Executive direction for federal action has existed for more than thirty-five years, starting with Executive Order 11988 of May 24, 1977, dealing with floodplain management. Long-term efforts aimed at avoiding and managing these risks, however, have succumbed time and again to short-term economic incentives. Executive Order 11988 should be applied with strong commitment to expenditures for disaster assistance and economic development, with a strong emphasis on leading investments and community development to avoid and mitigate flood risks.

Improve zoning and environmental regulations

Proper zoning and environmental regulations have the potential to mitigate much of the damage that typically accompanies natural disasters. A significant factor in the Hurricane Katrina damage was the substantial loss of wetlands, which can act as a protective barrier in coastal regions. Further environmental regulations to protect and rehabilitate coastal wetlands are necessary, and can be partially achieved through better zoning laws that prohibit wetland-damaging development. Building projects should also be restricted in other areas at great risk for natural disasters. To that end, among other steps, building codes should be more strictly enforced and updated to require increased "freeboard" through elevating building construction considerably above calculated flood levels to take into account sea-level rise, climate variability, and uncertainty in prognostications about future flood heights. These precautions can prevent significant future casualties and property damage.

FEDERAL COST SHARING

When a natural disaster as catastrophic as Hurricane Katrina or Sandy hits, the federal government should—and does—provide assistance to state and local governments for infrastructure repair. When the federal government bears too high a percentage of the cost of rebuilding, however, it exacerbates the

moral-hazard problem and reduces local incentives to diminish risks and control the costs of repairs. Reducing the federal share of the costs of natural disasters would improve incentives for local governments to invest in disaster-mitigating projects and reforms and to carry out rehabilitation in the most efficient and cost-effective way possible.

Remove tax deductions for damaged property not in compliance with federal standards

Greater internalization of costs by those who choose to reside in areas of high risk can also help shift much of the burden from federal taxpayers and help bring down overall costs of natural disasters. One way to help achieve this goal is for the IRS to remove deductions for losses and damages that result from failure to comply with federal standards. We propose removing deductions for damaged properties failing to carry required flood insurance and removing deductions for local real-estate taxes and mortgage interest for properties built in areas at the most serious risk of disaster, but that are not built to current federal minimum standards. Pre-existing structures could be partially grandfathered in so that their owners, who tend to be disproportionately elderly and low-income, are not adversely affected. Eliminating these deductions will not only reduce the federal share of loss-coverage, but also will encourage people to take better precautions against damage from natural hazards by purchasing insurance.

Tie federal relief to communities' future disaster mitigation

Another way to reduce the federal government's cost burden and ensure that federal funds are spent appropriately is to harmonize federal programs and require more-effective floodplain management and hazard-mitigation standards to accompany all federal spending such as Community Development Block Grants, especially those made following disasters. Recent disaster appropriation bills, for example, have added huge amounts of assistance to be delivered through community block grants. To ensure that the funds will be spent appropriately, and to reduce the costs of subsequent disasters, local authorities should adopt and enforce standards to increase the focus on disaster mitigation and community planning to reduce risks. Recent Sandy legislation included \$16 billion for such grants. A 2007 analysis building on work by the Multihazard Mitigation Council (2005) showed a three-to-one benefit-to-cost ratio for hazard-mitigation investments (CBO 2007). The potential savings from requiring Community Development Block Grants investments to emphasize hazard mitigation would be considerable, likely in the tens of billions of dollars.

Currently, disaster policy pays little attention to how communities actually manage their risks and vulnerabilities, except through some inadequate planning requirements.

Because states and communities set and implement basic land-use laws and building codes, it is critical to give communities a clear stake in implementing hazard mitigation. A model for this approach could be the NFIP's Community Rating System, a program that provides incentives in the form of discounted flood insurance premium rates for communities to engage in floodplain management activities that exceed minimum NFIP requirements.

In this vein, the federal cost sharing under the Stafford Act Public Assistance, which helps states and local governments rebuild infrastructure and provides other emergency aid, should be set on a sliding scale based on how effectively a community had attempted to mitigate loss, rather than at the current level of 75 percent of eligible costs basis (subject to increases at the discretion of the president). Frequent decisions to go above the Stafford Act's minimum 75 percent federal share mean that local communities face little or no out-of-pocket cost from damage to local infrastructure. Although such decisions by the federal government are well-intentioned attempts to assist communities in times of need, eliminating these costs for state and local governments discourages mitigation investments and could have the unintended consequence of increasing losses from future disasters. Using a sliding-scale to set the federal share of costs is similar both to the NFIP's Community Rating System described above and to the system long used by the insurance companies in the United States to incentivize behavior that reduces fire risk and losses. Similar sliding-scale treatment should also be made for local cost-shares for Army Corps of Engineers flood control and Department of Transportation disaster assistance. Shifting to these incentive-based policies for hazard mitigation would ensure that local communities have more of a vested interest in making investments that minimize risks.

Work with private insurance companies to promote more effective coverage

Uninsured losses are also a major burden for federal taxpayers, who often end up bearing most of the financial burden for these losses following a catastrophe. Many homeowners in high-risk areas forego private insurance against disasters or flood coverage through the NFIP. For example, 90 percent of Californians do not have earthquake insurance, and many NFIP policyholders decide to cancel their insurance after several years without witnessing a major flood (Kunreuther and Michel-Kerjan 2012). When a catastrophe does occur, much of the time the federal government assumes most of the costs for these uninsured losses. Kunreuther and Michel-Kerjan (2009) propose that policymakers encourage individuals in at-risk areas to enter into long-term insurance, where the policy is written for the property, not the individual, and the policy is fixed for a long time period, rather than one year. Long-term

insurance contracts offer more rate certainty for policyholders and also discourage individuals from canceling insurance policies after long periods without disasters.

There are other methods by which policymakers can institute greater private cost-sharing to lessen the burden borne by the federal government after a natural disaster. We recommend purchasing reinsurance for NFIP catastrophic-loss coverage from the private sector and setting surcharges to reflect costs. In addition, policymakers should encourage entry by private insurers to cover the routine risks while the federal government focuses aid against catastrophic risks. This strategy conserves federal funding and manpower for larger-scale disasters; in addition, private insurance may be more efficient in some circumstances.

REFORMS TO THE NATIONAL FLOOD INSURANCE PROGRAM

There are also several opportunities for reforms within the NFIP to incentivize activities that would reduce the likelihood and costs of flood-related losses. For one, the NFIP should charge risk-based premiums and update risk assessments for the effects of climate change. This includes updating flood maps, mapping five-hundred-year floodplains, and requiring actuarial-based insurance in at-risk areas. Such steps would reduce risks by allowing potential builders and homeowners to select their sites more carefully, possibly before building or investing in flood-prone areas.

The NFIP should phase in actuarial rates for 800,000 subsidized older, primarily residential properties, which have a higher risk of flood damage and were not part of the Biggert-Waters Flood Insurance Reform Act of 2012. A means-tested voucher system should be instituted to address any hardships for lower-income residents, however. The associated savings from this reform amount to \$600 million annually (FEMA 2012). We also

recommend that the NFIP phase in actuarial rates for future increasing shoreline erosion hazards and incorporate erosion setback requirements for new or reconstructed buildings on erosion-prone coasts, including the coasts of the Great Lakes. Over the next sixty years, erosion will likely claim one in four houses within five hundred feet of U.S. shorelines. In 2000, approximately 350,000 structures were located in this zone—excluding all densely populated urban city areas (H. John Heinz Center and FEMA 2000). Additionally we recommend phasing in actuarial rates for areas that will be impacted by inevitable sea-level rise or inland flood-height increases due to improper development upstream. Costs of losses due to sea-level rise and future likely development in upper watersheds are not incorporated in NFIP rates, yet the NFIP will pay for most such losses (Larson and Plasencia 2001). These reforms could, in the authors' opinions, yield \$400 million in annual savings, and even more if higher standards are imposed.

Conclusion

Not only is the United States experiencing natural disasters that are more catastrophic, but also, from both financial and human perspectives, each disaster is becoming more expensive. As we consider changes in federal policy that can best reduce the mounting toll of these hazards, we must be guided by the principle that the best disaster response and recovery come from proper planning, land use, and building codes that prevent disasters from occurring in the first place. While the federal government will continue to support those Americans who are the victims of these catastrophes, policymakers must work to promote disaster mitigation and devise a more equitable cost-sharing structure for natural disasters. Indeed, such an approach will save money and, more importantly, lives.

Authors

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References

- Abel, Jaison R., Jason Bram, Richard Deitz, and James Orr. 2012. "How Will We Pay for Superstorm Sandy?" December 20. *Liberty Street Economics*. Federal Reserve Bank of New York.
- Congressional Budget Office (CBO). 2007. "Potential Cost Savings from the Pre-Disaster Mitigation Program." September. Author, Washington, DC. <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/86xx/doc8653/09-28-disaster.pdf>
- . 2011. "Reducing the Deficit: Spending and Revenue Options." March. Author, Washington, DC. <https://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/120xx/doc12085/03-10-reducingthedeficit.pdf>
- Congressional Research Service (CRS). 2011. "Disaster Relief Funding and Emergency Supplemental Appropriations." R40708. April 12. By Bruce R. Lindsay and Justin Murray. Author, Washington, DC.
- Cummins, J. David, Michael Suher, and George Zanjani. 2010. "Federal Financial Exposure to Natural Catastrophe Risk." In *Measuring and Managing Federal Financial Risk*, edited by Deborah Lucas. February. National Bureau of Economic Research. Chicago: University of Chicago Press.
- . Forthcoming. "Update to Federal Financial Exposure to Natural Catastrophe Risk."
- Federal Emergency Management Agency (FEMA). 2012. *Repetitive Loss Summary as of November 2012*. Data supplied by FEMA at the author's request on January 15, 2013.
- Government Accountability Office (GAO). 2012. "Crop Insurance Savings Would Result from Program Changes and Greater Use of Data Mining." March. Author, Washington, DC.
- H. John Heinz III Center for Science, Economics, and the Environment, and the Federal Emergency Management Agency (FEMA). 2000. April. "Evaluation of Erosion Hazards." Author, Washington, DC.
- Kolat, J., J. Kasprzyk, W. Thomas Jr., A. Miller, and D. Divoky. 2012. "Estimating the Impacts of Climate Change and Population Growth on Flood Discharges in the United States." *Journal of Water Resources Planning Management*, American Society of Civil Engineers, 138: 442–452.
- Kunreuther, Howard C. and Erwann O. Michel-Kerjan. 2009. "Market and Government Failure in Insuring and Mitigating National Catastrophes: How Long-Term Contracts Can Help." In *Public Insurance and Private Markets*. Washington, DC: AEI Press.
- . 2012. "Paying for Future Catastrophes." November 24. *New York Times*.
- Larson, Larry, and Doug Plasencia. 2001. "No Adverse Impact: A New Direction in Floodplain Management Policy." November. *Natural Hazards Review* 2 (4): 167–181.
- Moss, David A. 1999. "Courting Disaster? The Transformation of Federal Disaster Policy since 1803." In *The Financing of Catastrophe Risk*, edited by K. A. Froot, 307–363. Chicago: University of Chicago Press.
- . 2002. *When All Else Fails: Government as the Ultimate Risk Manager*. Cambridge, MA: Harvard University Press.
- Multihazard Mitigation Council. 2005. "Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities." National Institute of Building Sciences, Washington, DC.
- National Climate Assessment and Development Advisory Committee (NCADAC). 2013. "National Climate Assessment (Draft for Public Comment)." January 11. Department of Commerce, Washington, DC.
- National Science Technology Council (NSTC). 2005. "Grand Challenges for Disaster Reduction: Report of the Subcommittee on Disaster Reduction." June. Committee on Environment and Natural Resources, Executive Office of the President, Washington, DC.
- Sumner, Daniel A., and Carl Zulof. 2012. "Economic and Environmental Effects of Agricultural Insurance Programs." July. Council on Food, Agriculture & Resource Economics, Washington, DC.
- Thomas, Edward A., and Sarah Bowen. 2009. "Preventing Human Caused Disasters." November. *Natural Hazards Observer* 34 (2): 1–9.
- Thomas, Edward A., Alessandra Jerolleman, Terri Turner, Darrin Punchard, and Sarah Bowen. 2011. "Planning and Building Livable, Safe & Sustainable Communities: The Patchwork Quilt Approach." June 11. Natural Hazard Mitigation Association, Metairie, LA.
- U.S. Department of the Interior (DOI). 2002. "The Coastal Barrier Resources Act: Harnessing the Power of Market Forces to Conserve America's Coasts and Save Taxpayer's Money." August. Fish and Wildlife Service, Division of Federal Program Activities, Washington, DC.

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