



National Strategy Recommendations: Future Disaster Preparedness

September 6, 2013
Fiscal Year 2013 Report to Congress



Homeland
Security

Federal Emergency Management Agency

Message from the Administrator

September 6, 2013

I am pleased to present the following report, “National Strategy Recommendations: Future Disaster Preparedness,” which has been prepared by the Federal Emergency Management Agency (FEMA).

This document has been compiled pursuant to a requirement in the Section 1111 of the *Sandy Recovery Improvement Act of 2013* (P.L. 113-2).

Pursuant to congressional requirements, this report is being provided to the following Members of Congress:



The Honorable John R. Carter
Chairman, House Appropriations Subcommittee on Homeland Security

The Honorable David E. Price
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable Mary L. Landrieu
Chairman, Senate Appropriations Subcommittee on Homeland Security

The Honorable Daniel Coats
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

The Honorable Michael McCaul
Chairman, House Committee on Homeland Security

The Honorable Bennie G. Thompson
Ranking Member, House Committee on Homeland Security

The Honorable Bill Shuster
Chairman, House Committee on Transportation and Infrastructure

The Honorable Nick J. Rahall II
Ranking Member, House Committee on Transportation and Infrastructure

The Honorable Tom Carper
Chairman, Senate Committee on Homeland Security and Governmental Affairs

The Honorable Tom A. Coburn, M.D.
Ranking Member, Committee on Homeland Security and Governmental Affairs

Inquiries relating to this report may be directed to me at (202) 646-3900 or to the Department's Chief Financial Officer, Peggy Sherry, at (202) 447-5751.

Sincerely,

A handwritten signature in blue ink, appearing to read 'W. Craig Fugate', with a long horizontal flourish extending to the right.

William Craig Fugate
Administrator
Federal Emergency Management Agency

Executive Summary

The enclosed report provides FEMA's recommendations for the development of a national strategy for reducing costs, loss of life, and injuries associated with extreme disaster events in vulnerable areas of the United States. Development of a national strategy presents an opportunity to engage all sectors of society in a national dialogue and to set the stage for both short-term and long-term actions to measurably enhance national resilience.

Because of the interaction of factors such as climate change, shifting demographics, aging infrastructure, and globalized supply chains, the Nation faces increasing risks and mounting costs from disasters in the near- and long-term future. Damages from natural disasters have increased in recent decades, and this trend will likely continue as more people choose to live in areas vulnerable to more-frequent and severe extreme weather events. Meanwhile, these extreme events undermine and overburden our critical infrastructure, forcing both the public and private sectors to address the increased risks and ever-increasing financial and social costs. This has left local communities vulnerable and, in some cases, overwhelmed. Experts agree that we will continue to see increased costs associated with these events if we do not take substantive action to increase resilience in order to reduce losses and enhance life and property safety.

The goal of a national strategy for reducing costs, loss of life, and injuries should be to create a road map for future investments in order to build a safer, more-resilient nation and to lessen disaster response and recovery costs, injury, and loss of life. Decreasing the costs of disasters and increasing resilience is a shared responsibility that transcends the Federal Government and is affected by the choices of citizens, businesses, communities, and governments at all levels.

FEMA's primary mission is to support our citizens and first responders in building the Nation's capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. As such, FEMA is working closely with partners across the Whole Community to address future challenges and increasing risks from disasters, including economic risks.

Recognizing the importance and breadth of scope that a meaningful and successful national strategy for reducing costs, loss of life, and injuries should encompass, the following recommendations should be considered in the development of a National Strategy: 1) engage in a Whole Community dialogue and build upon public-private partnerships, 2) enhance data-driven decisions, 3) align incentives promoting disaster cost reduction and resilience, 4) enable resilient recovery, and 5) support disaster risk reduction nationally.

Ultimately, disaster-resilient communities experience less disruption to daily life and local economies after a disaster. A national strategy on disaster costs reduction could help drive new and innovative approaches to reduce the impacts of potential catastrophic disasters on individuals and communities across the Nation.



National Strategy Recommendations: Future Disaster Preparedness

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I. Legislative Language

This document has been compiled in response to language in Section 1111 of the *Sandy Recovery Improvement Act of 2013* (P.L. 113-2; SRIA), which states.

SEC. 1111. RECOMMENDATIONS FOR REDUCING COSTS OF FUTURE DISASTERS.

(a) REPORT TO CONGRESS.—Not later than 180 days after the date of enactment of this division, the Administrator of the Federal Emergency Management Agency shall submit to Congress recommendations for the development of a national strategy for reducing future costs, loss of life, and injuries associated with extreme disaster events in vulnerable areas of the United States.

(b) NATIONAL STRATEGY.—The national strategy should—

(1) respect the constitutional role and responsibilities of Federal, State, and local governments and the private sector;

(2) consider the vulnerability of the United States to damage from flooding, severe weather events, and other hazards;

(3) analyze gaps and duplication of emergency preparedness, response, recovery, and mitigation measures provided by Federal, State, and local entities; and

(4) include recommendations on how to improve the resiliency of local communities and States for the purpose of lowering future costs of disaster response and recovery.

II. Background

Over the past few decades, disasters of all types have occurred with more regularity and severity, with substantial costs to the American people in terms of disaster aid, economic disruptions, injuries, and lives lost. In its 2012 report “Severe Weather in North America,” Munich Re, the world’s largest reinsurance company, pointed out that North America has been most affected by weather-related extreme events in recent decades (Hurricane Katrina, tornadoes, floods, wildfires, searing heat, and drought), and that this trend is likely to continue as a result of climate change. Between 1980 and 2011, North America suffered \$1.06 trillion in total losses including \$510 billion in insured losses, and the number of weather-related loss events increased five-fold over the previous three decades. (Munich RE, 2012)

Scientists and insurance industry leaders report that the United States led the world in disaster losses in 2012, with drought, wild fires, floods, and Hurricane Sandy that wreaked havoc and blackouts along the East Coast. As reported on EENews.net, more than 90 percent of insured losses worldwide occurred in the United States, well above the 30-year average of 65 percent. (Lehmann, 2013)

The worldwide loss of life and economic disruption caused by disasters is an increasing focus of attention. Although the trend in loss of life is downward, the economic impacts of disaster are rising as a growing share of the world’s population and economic activity is being concentrated in increasingly disaster-prone places: on coasts and river deltas, near forests, and along earthquake fault lines. America’s coasts may be a microcosm of where the world is headed. Florida’s population has grown from 2.8 million persons in 1950 to 19 million in 2012. Howard Kunreuther and Erwann Michel-Kerjan, disaster experts at the Wharton Business School in Pennsylvania, estimate that “there are now nearly \$10 trillion of insured and hurricane-prone assets along the coast from Maine round the Florida peninsula to Texas.” (Kunreuther, 2010) Roger Pielke of the University of Colorado at Boulder argues that “the Great Miami Hurricane of 1926, which cost \$1 billion in 2011 dollars, would cause \$188 billion of damage now.” (Pielke, 2012)

The importance of confronting the impacts—both social and economic—of disasters on the well-being of the country was explicitly recognized in the Department of Homeland Security (DHS) Quadrennial Homeland Security Review (QHSR) of 2010:

The Nation’s ability to withstand threats and hazards requires an understanding of risks and robust efforts to reduce vulnerabilities. Mitigation provides a critical foundation to reduce loss of life and property by reducing vulnerabilities and avoiding or lessening the impact of a disaster, thereby creating safer communities. Mitigation seeks to break out of the cycle of disaster damage, reconstruction, and repeated damage. Mitigating vulnerabilities reduces both the direct consequences and the response and recovery requirements of disasters.” (Department of Homeland Security, 2010)

This is further emphasized in the White House National Security Strategy of 2010:

We must ... enhance our resilience – the ability to adapt to changing conditions and prepare for, withstand, and rapidly recovery from disruption. When incidents occur, we must show resilience by maintaining critical operations and functions, returning to our normal life, and learning from disasters so that their lessons can be translated into pragmatic changes when necessary. (National Security Staff, 2010)

In its February 2013 biennial update to its High-Risk Series, the Government Accountability Office (GAO) added as an area of concern “Limiting the Federal Government’s Fiscal Exposure by Better Managing Climate Change Risks.” As the report states:

Climate change creates significant financial risks for the federal government, which owns extensive infrastructure, such as defense installations; insures property through the National Flood Insurance Program (NFIP); and provides emergency aid in response to natural disasters. The federal government is not well positioned to address the fiscal exposure presented by climate change, and needs a government wide strategic approach with strong leadership to manage related risks. (GAO, 2013)

The National Bureau of Economic Research, in a 2010 report, provides an alarming analysis of the significance of future federal disaster liabilities:

Tak[ing] the expected annual expense over the next seventy-five years and comput[ing] a net present value (NPV) ... yields a figure between \$1.2 and \$7.1 trillion [for future disaster liabilities], depending on assumptions of growth and discount rates. For comparison, the trustees of Social Security project a shortfall with an NPV of \$4.9 trillion over this same horizon. (Cummins, 2010)

The Federal Government’s potential financial liabilities related to increases in extreme weather events are a small portion of potential losses to the private sector and other levels of government, but FEMA and other federal agencies have a responsibility to continually explore opportunities for reducing costs and increasing efficiencies in the provision of federal disaster assistance. A national strategy should contain a thorough discussion of U.S. vulnerabilities, particularly to natural disasters, and should support this discussion with quantitative analysis of the type and cost of recent disasters.

FEMA’s Initiatives to Reduce Costs, Loss of Life, and Injuries

FEMA is working to build unity of effort across the emergency management community and in partnership with the Whole Community. Through the National Preparedness System (NPS), FEMA and state, local, tribal, territorial, and private-sector partners have begun to develop strategies and approaches to build resilience in the face of current and future risk, leveraging existing resources and capabilities. As a concept, Whole Community is a means by which residents, emergency management practitioners, organizational and community leaders, and

government officials can collectively understand and assess the needs of their respective communities and determine the best ways to organize and strengthen their assets, capacities, and interests. By doing so, a more-effective path to societal security and resilience is built. In a sense, Whole Community is a philosophical approach on how to think about conducting emergency management. (FEMA, 2011)

Preparedness Initiatives

In 2011, FEMA launched an effort to build an integrated, layered, all-of-Nation approach to preparedness, as called for by the NPS within Presidential Policy Directive 8 (PPD-8): National Preparedness. As such, the Whole Community approach is being incorporated into all PPD-8 deliverables, including the National Preparedness Goal, NPS description, National Planning Frameworks, and the campaign to build and sustain preparedness nationwide, as well as leverage the approach in the deliverables' development. In support of these efforts, FEMA seeks to spark exploration into community engagement strategies to promote further discussion on approaches that position local residents for leadership roles in planning, organizing, and sharing accountability for the success of local disaster management efforts, and that enhance our Nation's security and resilience.

Major strategic documents under PPD-8, such as the National Response Framework, National Disaster Recovery Framework, and the National Mitigation Framework, are bringing greater awareness of the roles of every sector of society in building safer, more resilient communities. For example, the first edition of the National Mitigation Framework promotes the fostering of a culture of preparedness, centered on risk and resilience. The document provides context for how the Whole Community works together and how mitigation efforts relate to all other parts of national preparedness. The Mitigation Framework covers the capabilities necessary to reduce the loss of life and property by lessening the impact of disasters. The framework focuses on understanding the risks we face, as well as empowering communities to take actions that put them in the best position to bounce back quickly and effectively when disasters occur. This focus on risk and resilience is why the Mitigation Framework permeates all other areas of national preparedness, from prevention to recovery.

Introduced in 2012, the Threat and Hazard Identification and Risk Assessment (THIRA) enables FEMA regions, states, and urban areas to identify and assess risks and associated impacts, using a consistent nationwide approach. It strengthens existing risk methodologies by continuing to incorporate the Whole Community's input throughout the entire process and by accounting for important community-specific factors in setting capability targets. Using the THIRA capability estimation and assessment processes, jurisdictions can develop strategies to allocate resources more effectively to achieve capability targets and reduce risk. By implementing a continuous cycle of assessing capabilities, plans, and programs and incorporating the results into future THIRAs, jurisdictions are able to manage changes in the risk landscape through the development and implementation of mitigation solutions (thus engaging in data-driven decision making that ultimately drives down the costs of future disasters).

Over the past 10 years, federal investments in state, local, tribal, and territorial preparedness capabilities have developed significant national capacity to prevent, protect against, mitigate,

respond to, and recover from all kinds of disasters and threats. Preparedness grants support the development and sustainment of core capabilities across all mission areas. From FY 2003 to present, FEMA has awarded more than \$35.6 billion to state and local partners in preparedness grant funds. In FY 2012, DHS preparedness grants required grantees to belong to the Emergency Management Assistance Compact (EMAC) and to ensure that grant-funded capabilities are deployable outside of their communities to support regional and national efforts, whenever possible.

To improve overall grant program effectiveness, DHS continues to explore opportunities to streamline programs, improve the ability to measure performance, build readily deployable and shareable capabilities, and ensure that grant funds address capability gaps identified through THIRA and capability estimation and assessment processes. For example, the FY 2014 President's Budget proposed to build on those investments through the National Preparedness Grant Program, which seeks to sustain and continue to build on these capabilities to create robust national capacity based on cross-jurisdictional and readily deployable state and local assets. Another example is the work of the Emergency Communications Preparedness Center in coordinating with DHS and other federal agencies in identifying federal funding for emergency communications. By building a unity of effort across the emergency management community through the National Planning Frameworks and preparedness initiatives, overall cost savings may be found through improved integration and reduced overlap and duplication among the Whole Community.

Disaster Assistance Initiatives for Response, Recovery, and Mitigation

FEMA has also increased its efficiency by instituting organizational changes in the provision of disaster assistance, in the response, recovery, and mitigation areas. Disaster response and recovery is, by its very nature, labor-intensive, requiring deployment of trained and qualified staff to provide the services required by disaster survivors. Beginning in 2012, FEMA began implementing several initiatives to ensure a stable, flexible, and fully qualified disaster workforce that is capable of responding to multiple major incidents, including those with catastrophic impacts. The foundation of this workforce is a force model that estimates the number of personnel FEMA requires in diverse incident management and support roles such as community relations, logistics, and operations. FEMA has also built a qualification system that defines the training, experience, and demonstrated performance required to become credentialed in each of these positions and outlines career paths within the disaster workforce. In the coming years, FEMA will continue to ensure sufficient numbers of personnel become credentialed in the positions required by our force model.

Finally, FEMA has improved the mechanisms through which the agency recruits and retains disaster personnel, including an overhaul of the former Disaster Assistance Employee Program to a new Reservist Program requires reservists to obtain standardized training and maintain more-consistent availability. FEMA and the Corporation for National and Community Service have also partnered to launch an innovative program called FEMA Corps that recruits talented young leaders into the emergency management field through a 10-month service assignment with FEMA. By ensuring the appropriate number of qualified staff is available, FEMA can become

more effective and more efficient at supporting states and local communities as they respond to and recover from disasters.

Over the past several years, FEMA has overhauled its recovery capability to provide individual assistance (IA) more quickly and efficiently. In 2005, FEMA had a daily capacity to perform 7,500 home inspections that were used to determine which FEMA repair and replacement grants a disaster survivor may be eligible to receive. Today, FEMA's capacity has increased to 20,000 home inspections daily by the 15th day of the disaster. This allows disaster survivors to obtain assistance far more quickly, thereby hastening individual recovery efforts and reducing disruption to local economies.

Through the incorporation of geospatial imagery, as well as adoption of innovative technologies such as mobile applications, FEMA has further increased its ability to respond more quickly to the needs of disaster survivors. For example, in Hurricane Sandy, FEMA utilized geospatial satellite imagery to expedite rental assistance to disaster survivors in the surge area whose homes were deemed inaccessible. Through this effort, FEMA was able to expedite a total of \$130,525,776 to 44,073 eligible disaster survivors in New York and New Jersey for 2 months of initial rental assistance, without having to wait for homes to become accessible to inspectors. On the basis of geospatial data:

- New York: 31,478 disaster survivors were determined eligible for \$96,427,598 in rental assistance
- New Jersey: 12,595 disaster survivors were determined eligible for \$34,098,178 in rental assistance

FEMA has also established Internet and mobile phone registration and an intake surge capacity in the contact centers that enables us to serve more disaster survivors with greater scalability than ever before. Moreover, because the identity of nearly all applicants is authenticated at registration, FEMA is able to strengthen controls against waste, fraud, and abuse. For example, an Individuals and Household Program (IHP) Assistance Group was created in 2009 to provide clear, consistent, and timely guidance regarding IHP policies and case processing procedures to reduce case processing errors, and improve operational efficiency and overall delivery of service. The National Processing Service Centers have also established an audit group responsible for performing internal audits and analysis on the efficiency and effectiveness of the manner in which IHP is administered. As a result of these efforts, the IHP's Improper Payment Error Rate for FY 2011 was statistically 0 percent, a commendable improvement from as little as 5 years ago when the rate was 6.28 percent following Hurricanes Gustav and Ike.

Substantial progress has also been made on mitigating the loss of life and working to mitigate the economic and social costs of large-scale disasters. This past fiscal year, FEMA initiated 385 Risk Mapping, Assessment, and Planning projects affecting 5,100 communities and addressed the highest-priority engineering data needs, particularly coastal and levee areas. In addition, mitigation efforts resulted in an estimated \$1.7 billion in avoided losses. The NFIP has more than 5.5 million flood insurance policies in force, representing more than \$1.25 trillion in property coverage from flood loss.

To help save lives in extreme wind events, FEMA encourages construction of safe rooms through grant programs like the Hazard Mitigation Grant Program as well as by producing technical guidance on how to construct safe rooms and then having that guidance incorporated into the Nation's building codes. Since 1999, FEMA has helped fund 1,334 community safe rooms in 20 states, including 235 in 2011, a nearly 90-percent increase from the 124 rooms constructed with FEMA funding in 2010. Additionally, FEMA helps translate scientific testing and analysis from the academic engineering and materials science communities into state-of-the-art guidance that homeowners and communities can use to construct these life-saving shelters. FEMA also works with partners in the building code community to translate guidance and best practices into requirements and standards. In the Mitigation Assessment Team report on the 2011 tornado outbreaks, FEMA recommended that new schools and first responder facilities incorporate safe rooms in their construction. Working with the International Building Code, the design criteria and performance standards developed by FEMA have been incorporated in the Nation's building codes and standards. This will increase the number of lives saved in future events even without the federal investment, and communities will become more disaster-resistant in future tornado events.

FEMA's Mitigation programs save lives, prevent injury, and provide the American public an estimated \$3.4 billion dollars annually through a strategic approach to natural hazard risk management. According to a 2005 report by the Multi-hazard Mitigation Council, a public/private partnership designed to reduce the economic and social costs of natural hazards, FEMA grants disbursed between 1993 and 2003 to mitigate the effects of floods, hurricanes, tornados, and earthquakes are expected to save more than 220 lives and prevent almost 4,700 injuries over approximately 50 years. In 2011, FEMA's Hazard Mitigation Assistance programs helped local communities across the United States prepare for future disasters by providing up to \$252 million in flood grant funds for mitigation activities affecting more than 1,300 properties. These measures are expected to result in avoidance of approximately \$502 million in potential losses for flood programs. FEMA's mitigation efforts play an essential role in the agency's mission by increasing the resiliency and reducing the financial impact of disasters.

Sandy Recovery Improvement Act of 2013

In implementing the SRIA provisions, FEMA is in the process of exploring significant changes to the disaster declaration criteria and to the processes underlying the provision of disaster assistance to states and communities, along with other programmatic changes that may result in significant reductions to disaster costs. Some of the programmatic changes called for in SRIA either are already under way or will provide opportunities such as:

- Expediting the environmental review for hazard mitigation projects;
- Allowing local governments greater flexibility to consolidate or rebuild facilities by allowing FEMA to issue fixed-price grants on the basis of damage estimates instead of a traditional reimbursement process based on actual costs;
- Cutting debris removal costs dramatically by implementing reforms from a successful 2006 debris removal pilot program that enable operations to be conducted more cost-effectively and incentivize the completion of projects;

- Providing the agency explicit authority to lease and repair rental units for use as direct temporary housing;
- Establishing a limited dispute-resolution pilot program to resolve disputes over assistance that increases flexibility for applicant recourse and the speed at which disputes are resolved, and provides information that can be used to determine if such a program should be a permanent option;
- Reforming IA disaster declarations criteria; and
- Allowing federally recognized tribes the choice to request emergency and major disaster declarations directly from the President.

A national strategy should contain detailed quantitative analysis of the types and costs of recent disasters, including trend analysis, and outcomes associated with federal investments.

Bringing the Whole Community Together

Although traditional approaches to disaster preparedness, including mitigation, response, and recovery, have leaned heavily toward a government-centric model, the evolving nature of disasters in the United States calls for a broader perspective by bringing the Whole Community together to identify and implement ways of addressing the escalating financial and social costs tied to these catastrophic events. Environmental issues such as climate change, societal shifts, and newly evolving paradigms challenge the Nation's emergency management community and other partners to think in new ways and bring every capability of every sector of society to bear to develop a more-resilient nation. Increasing numbers and severity of events will continue to negatively affect the national economy and the safety and welfare of its citizens, and challenge the ability of government at all levels to resource preparedness efforts, including mitigation, response, and recovery efforts.

Individuals, families, neighborhoods, communities, and the private sector will play an increasingly active role in helping to meet future emergency management needs. In particular, the public's ability and desire to self-organize and build community-based solutions to emerging challenges will continue to grow, as the roles of individuals within communities, access to information, and technology evolve. We need to work together across the Whole Community to find ways to spark this independent and innovative thinking to build future resiliency and reduce disaster costs.

Ultimately, any effort to reduce costs, loss of life, and injuries is a shared responsibility and depends on choices made by individuals, private businesses, and local communities, as well as a range of state, tribal, territorial, and Federal Government agencies. As FEMA Administrator Fugate pointed out in testimony before the Transportation and Infrastructure Committee's Subcommittee on Economic Development, Public Buildings, and Emergency Management in March 2011:

It goes to the question of investing before disasters happen, in mitigation and other activities, to buy down, literally, the risk of this country. ... I think the way you become cost effective is to look at a very simple idea, and that is do not compete with the private sector and what they do every day, and look at how,

when a disaster occurs, we can maximize what they do so we expend our Federal dollars in those areas and gaps that would occur in the response. But I think it is that balance between where we can in future development, future growth, mitigate those risks, and look at how, through continuing programs, we can reduce that risk in those existing areas, whether they are in a flood plain, or whether they are in an earthquake-prone area, that building codes and other tools can help reduce that risk for future disaster.

Developing a national strategy for reducing costs, loss of life, and injuries presents an opportunity for challenging current assumptions; incorporating future risks; brainstorming new and innovative approaches to disaster preparedness, mitigation, response, and recovery; and examining the decision calculus in order to reduce our collective risk. The national strategy should create a road map for future investments in ways that will allow all Americans to participate in building a safer, more-resilient future that reduces disaster response and recovery costs, injuries, and loss of life.

III. Recommendations for a National Strategy

A national strategy for reducing costs, loss of life, and injuries needs to have a broad, but well-defined scope with implementable actions and achievable results. This document provides recommendations for multiple areas that could be further explored during the development of a national strategy, grouped within the following themes:

- Engage in a Whole Community Dialogue and Build upon Public-Private Partnerships
- Enhance Data-Driven Decisions
- Align Incentives Promoting Disaster Cost Reduction and Resilience
- Enable Resilient Recovery
- Support Disaster Risk Reduction Nationally

Overall, a national strategy should adopt a multi-faceted approach that positions the Nation to reduce its exposure to, and better respond to and recover from, costly disasters. These recommendations offer examples of areas that would need much greater discussion and research to develop into a strategic and actionable path forward. However, implementation of cost reduction and cost avoidance strategies will require commitment and investment by the Whole Community to achieve the potential long-term savings and impact.

Engage in a Whole Community Dialogue and Build upon Public-Private Partnerships

A national strategy for reducing costs, loss of life, and injuries that best serves the American people at all levels of society requires a comprehensive and inclusive approach that includes representatives from all levels of government, as well as critical Whole Community partners in the nonprofit, academic, and private sectors. The following recommendations provide examples of topics that harness the capabilities of the Whole Community in this critical endeavor:

- Explore options for more-efficient integration of federal, state, and local government efforts to better leverage current capabilities.
- Mutual aid, coupled with strategic pre-existing support contracts with the private sector, should be an integral component to building national capacity with ever-shrinking resources. This includes assessing opportunities and barriers to further advance the EMAC, cross-border partnerships, and public-private partnerships where appropriate.
- Engage in a national dialogue with the private sector and housing authorities on strategies to address challenges and limitations with disaster housing options for individuals and families. Housing is one of the biggest cost drivers of disaster recovery, so a national strategy could call for the exploration of economically beneficial options to better mitigate existing housing stock. For example, this could be a critical element of future updates to the National Disaster Housing Strategy.

- Identify and evaluate potential solutions for gaps or areas of duplication in emergency management that affect the Nation’s ability to respond to and rebuild efficiently and resiliently following major disasters.
- Form an interdisciplinary panel to review causes of disaster deaths and indicators of what factors reduced loss of lives, and to share research that informs interventions (i.e., education and awareness) and builds upon successful strategies.
- Augment research on individual and community behavioral change and social systems to understand how people make decisions within social networks during all phases of emergency management and how social dynamics drive resilience after disasters to include impacts on mass evacuations and emergence of community organizations that develop as a result of disasters, and may originate as unstructured and informal, yet goal-oriented, networks of people (i.e., neighbor helping neighbor). Examine the range of possible incentives that promote future resilience.
- Evaluate and recognize the impact of changing demographics; geographic location, age, ethnicity, education level, nationality, employment status, residency status, and language are all examples of demographics that are constantly in a state of change both domestically and across the world. Although change is constant, the implications of these changes to health, safety, and security can significantly affect both policy and operations. For example, shifts in population concentrations from rural to urban, or inland to coastal, can cause requirements for dramatic adjustments in resource needs, hazard preparedness levels, land-use policies, and local public health and safety policy.

Enhance Data-Driven Decisions

Reducing the costs of disasters and increasing resilience is a shared responsibility that transcends the Federal Government and is affected by the choices of citizens, businesses, and communities. The emergency management community needs to identify the most significant factors in rising disaster costs and risks (based on data from historical spending trends as well as future projections of development patterns and climate and demographic change), to properly analyze gaps and vulnerabilities within all phases of emergency management and at all levels of government and non-governmental and private sectors, and to consider appropriate intervention methods. However, as discussed in this report, a strategy should encompass a broader perspective by examining how data on risk exposure can inform decisions made by citizens, businesses, and communities daily. Building on the National Planning System and the tenets of the National Planning Frameworks, development of a national strategy will require the identification and utilization of a wide variety of methodologies, leveraging mechanisms, associations, platforms, and technologies that already exist to engage state, local, tribal, and territorial governments, the private sector, and the citizenry.

The following recommendations provide examples of topics that could be further researched to promote data-driven decision making, thereby increasing resilience, reducing risk, and reducing disaster costs through strategic investments and policy changes:

- Incorporate a wide spectrum of methodologies that support identification of the significant elements driving increased costs in current and future disasters, including, but not limited to:
 - technological—geographic information system-based mapping;
 - social—community-based workshops;
 - historical analysis—data from after-action reports and studies on historical spending/trends such as grants; loans; federal, state, local, tribal, and territorial operations support; and private-sector impacts; and
 - foresight—analysis and projections on future risks and vulnerabilities, trends, and developments to identify areas for potential intervention, including climate change impacts.

- Develop and implement a program to capture best practices and lessons learned from actions taken by all sectors of society under the National Strategy that maximizes and amplifies initiatives with measurable impact on reducing costs, injuries, and loss of life.

- Develop data and accountability channels for effective information sharing (data sharing agreements) across federal departments and agencies, with state and local governments and with the private sector. The ability of agencies and states to disseminate and receive data quickly and efficiently in the aftermath of a disaster is an essential component of a transparent and effective recovery. Whether agencies are sharing information with one another about assistance disbursed to individuals to avoid duplication of benefits, are passing information to states to help them administer their own programs, or are sharing information with private-sector businesses and organizations to better leverage efforts, the successful exchange of data is often the difference between a productive, timely response and one that is slow and reliant on incomplete information. Failure to transmit data efficiently and effectively can lead to delays that prevent individuals and small businesses from receiving urgently needed assistance.

- Apply science-based analysis regarding the cost of disasters and cost-drivers. This will help to eliminate false or misleading assumptions from the conversation and allow for data-driven decision making. This could include an examination of the interaction and cost transference trends among individuals, the insurance industry, and government disaster assistance programs. Determine data requirements and conduct analysis to provide a better understanding of true risk exposure over time (as well as who bears that risk) and how those data can inform land-use planning, flood plain management, and community development decisions. For example, insurance policies can work as a tool to discourage risk-taking and promote awareness of risk exposure in influencing individual and commercial decision making.

- Utilize data to compare alternative costs such as those for hardening infrastructure before a disaster versus repair and restoration of both the infrastructure itself as well as the services and function it provides. Compare other societal investments with those for disaster preparedness, mitigation, response and recovery. This will lead to a more-balanced and objective cost-benefit analysis of the appropriate investment for the Nation.

- Conduct research on measures that gauge federal return on investment for disaster assistance with a focus on long-term economic regrowth and taxable revenue.
- Capitalize on science and technology innovations to support communities in their efforts to become disaster resilient. Although the possibilities for future innovation and investment opportunities are myriad, the following actions reflect current examples of FEMA innovations:
 - FEMA has transformed the flood mapping program to produce all new products digitally, requiring state-of-the-art elevation mapping technology to improve the precision of the flood risk data
 - FEMA is combining digital maps with mobile computing to hold meetings where stakeholders can see their individual risk on a laptop computer or tablet.
 - Following Sandy, FEMA identified an urgent need to deliver updated flood risk information for coastal areas impacted. Although new analyses were already under way, several months were still necessary to complete the full analysis. By leveraging technology, FEMA was able to produce advisory estimates of the revised flood risk quickly and to publish those data through the FEMA Geo-Platform site.

Align Incentives Promoting Disaster Cost Reduction and Resilience

Development of a national strategy provides an opportunity to explore potential programmatic changes to create better alignment between government programs and private-sector interests, among federal, state, local, tribal, and territorial governments, and between individual citizens and government programs. The following recommendations are examples of areas in which incentives could be more closely aligned to promote disaster cost reduction and increased resiliency across all levels of government, the private sector, and individuals:

- Consider statutory changes that would tie community participation in the NFIP to eligibility for post-disaster assistance. Currently, if a community with a special flood hazard area decides not to participate in the NFIP, the individual residents are not eligible for post-disaster assistance. However, a national strategy could explore ramifications of limiting post-disaster assistance for both individual homeowners and public infrastructure within flood-prone communities that do not participate in the NFIP. This could generate greater incentives for a community to practice flood plain management techniques that protect development from future flooding.
- Explore alternative disaster declaration criteria and reimbursement approaches, such as a deductible model. Under the SRIA legislation, FEMA is currently examining criteria for IA disaster declarations, while Public Assistance (PA) disaster declarations are based in part on estimates of per capita disaster damages to eligible infrastructure and other costs under the PA program. However, a deductible model might encourage states and communities to take additional disaster preparedness measures that could positively affect disaster planning efforts and contribute to a reduction in costs, lives lost, or injuries.

- Explore options to align incentives between government and private-sector companies to promote risk reduction and resilience actions. For example, the World Economic Forum’s 2012 Global Risk Report features a special chapter on the global impacts of the Fukushima, Japan, tsunami and earthquake, citing examples of disruptions to global supply chains and stating that the Development Bank of Japan became the first bank in the world to offer better borrowing terms to companies that take steps to increase resilience. A national strategy should seek to improve understanding of private-sector incentives and to capitalize on practices that promote disaster risk reduction and resiliency.
- Promote improved coordination and efficiency measures in all phases of emergency management. Adopt mechanisms for more effective funds management at all levels of government. For example, FEMA could fully implement a Strategic Funds Management approach to ensure funds are made available once states have the capacity to execute them.

Enable Resilient Recovery

The development of a national strategy presents an opportunity to emphasize the importance of incorporating resiliency and mitigation techniques when rebuilding homes and businesses after a disaster strikes. The following recommendations are examples of areas in which a national strategy could promote sustained action to reduce costs, loss of life, and injuries after a disaster:

- Encourage and incentivize communities to consider more hazard-resilient and sustainable rebuilding, rather than simply replacing what was there before. This may include making funds available to reimburse investments that improve resilience in rebuilt infrastructure or homes or encouraging higher standards in rebuilding or hazard mitigation for critical public infrastructure. Identify opportunities to better utilize the full range of federal authorities to promote reductions in disaster costs, loss of life, and injuries. For example:
 - The National Institute of Standards and Technology has authority under the National Construction Safety Team Act to establish investigative teams to assess building performance and emergency response and evacuation procedures in the wake of any building failure that has resulted in substantial loss of life or that posed significant potential of substantial loss of life. Findings from any investigations could be better utilized to inform building codes and standards going forward.
 - Housing standards promulgated through the Department of Housing and Urban Development (HUD) and safety standards supported by the U.S. Fire Administration could further promote disaster resiliency.
 - SRIA provided for both HUD and the Department of Transportation to use their respective authorities to address some critical rebuilding efforts following Hurricane Sandy, effectively speeding up recovery for the stricken areas.
- Examine regulatory and other pressures that have the effect of reducing resiliency in critical systems (as noted in the President’s Climate Action Plan of 2013), and propose possible solutions.

- Encourage local emergency managers to work directly with school and district officials to integrate efforts, resources, and plans, to reduce risk, and to increase resiliency. The education sector and schools are present everywhere in the country, with responsibility for a vulnerable population of approximately 50 million children, including students with disabilities.
- Develop incentives for states, tribes, territories, or communities to adopt code-plus building standards, particularly for critical infrastructure. For example, the Pan American Health Organization developed construction guides and a tool called the Hospital Safety Index, both of which are being widely used by health authorities in Latin America to ensure that hospitals will be able to continue functioning in post-disaster situations. In developing a national strategy, research should be conducted on public-private partnership models that can guide development of incentives for private-sector property development with a more-informed focus on resilience and promote adoption of stronger building codes across the Nation.
- Encourage and incentivize communities to consider hazard-resilient development as an integrated standard for long-term economic and community development plans to include resilience as part of the base for long-term community planning, including integrating long-term changing conditions as a result of climate change.

Support Disaster Risk Reduction Nationally

To promote effective action, a national strategy for reducing costs, loss of life, and injuries needs to recognize the changing nature of disaster risks faced by the entire Nation—all levels of governments, private businesses, individuals, and the non-profit sector. The following recommendations provide examples of areas that require further research and discussion in this critical effort:

- Develop approaches in program and regulatory planning and implementation that better consider future disaster risks. Many existing government and private-sector programs examine historical data to inform current risks. However, this may have the effect of discounting unforeseen catastrophic events that require vastly different planning factors. In particular, it will become increasingly important to recognize and account for the potential impact of climate change on severe weather events and to address actions, policies, and strategies that will be necessary to mitigate, respond to, and recover from future events.
- Develop and implement analytical tools that provide better understanding of true risk exposure over time (as well as who bears that risk), including factors such as climate change and development patterns, to inform land-use planning, flood plain management, and community development decisions.
- Study the efficacy of alternative approaches to providing insurance against hazards. Currently, state-regulated private insurers offer coverage for most non-flood natural hazards, while the Federal Government offers flood insurance for many homes and

businesses in participating communities. However, the availability of local coverage varies widely, on the basis of specific conditions and disparate state regulations. Underinsurance is common for both flood and other types of disasters, leaving individuals in a position of assuming their own risk, then relying on government and non-profit assistance to recover from disasters. Low-income populations are more likely to experience sustained economic hardship and loss of life after a disaster. As stated earlier, North America suffered \$1.06 trillion in total losses from 1980 to 2011, including \$510 billion in insured losses, and in 2012, more than 90 percent of insured losses worldwide occurred in the United States. A national strategy could explore whether the current approach is optimal or whether other options should be considered.

- Include future risk in benefit/cost analysis to facilitate funding of hazard mitigation projects that will achieve a high return on investment. FEMA uses benefit/cost analysis to determine whether to fund specific hazard mitigation projects, but the data set informing benefit calculations primarily relies on historical data. By adjusting benefit/cost analysis to account for the changing nature of risks, FEMA can take into account long-term impacts on land use and the environment when determining whether specific projects warrant federal investment.

These recommendations are intended to be illustrative in nature. The final elements that would be included in a national strategy would require extensive study and analysis before courses of action could be promoted. Leaders across the Nation should recognize and accept there may be a need to invest additional resources now to reduce disaster costs, loss of life, and injuries in the long term.

Should Congress authorize the development of a national strategy, there will be need for a substantial effort across all sectors and communities of the Nation to ensure that the final product achieves the desired aims. As outlined in this report, major actions should include the following:

- Initiate a comprehensive and inclusive approach that includes representatives from all levels of government, as well as critical Whole Community partners in the nonprofit, academic, and private sectors.
- Encourage data-driven decision by identifying the most significant factors in rising disaster costs and risks, on the basis of data from historical spending trends and sound empirical analysis, as well as future projections, and by considering appropriate intervention methods.
- Develop and incentivize programmatic changes to promote disaster cost reduction and increased resiliency across all levels of government, the private sector, and individuals.
- Emphasize the importance of incorporating resiliency and mitigation techniques when rebuilding communities after a disaster strikes.
- Recognize the changing nature of disaster risks faced by the entire Nation, and develop approaches in program and regulatory planning and implementation that better consider future disaster risks.

Developing a national strategy as laid out in this report would require extensive outreach, independent research efforts, and significant implementation efforts, far beyond the scope of any

one government agency. Requirements would need to be identified and adequately resourced. Given the austere fiscal environment going forward, many of these concepts may not even get explored, much less implemented. Once a national strategy is completed, the lead agency should:

- Develop a national communications and education plan to support the roll out of the national strategy for reducing costs, loss of life, and injuries, by utilizing the capabilities of all levels of government and private-sector communications entities;
- Foster dialogue among Whole Community partners; and
- 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.

Finally, to guide implementation efforts, a national strategy should be viewed as a road map for future investments to build a safer, more-resilient Nation and to lessen disaster response and recovery costs, injury, and loss of life.

IV. Conclusion

In a report issued by the International Monetary Fund (IMF) just days before Hurricane Sandy struck the United States, the IMF reported that over the past 2 years, 700 natural disasters were registered worldwide affecting more than 450 million people, and that damages had risen from an estimated \$20 billion, on average, per year in the 1990s to about \$100 billion per year during the period from 2000 to 2010. This upward trend is expected to continue as a result of the rising concentration of people living in areas exposed to natural disasters, and increasing frequency and severity of extreme weather events due to climate change. (IMF, 2012)

Congress's call for recommendations to develop a national strategy for reducing costs, loss of life, and injuries associated with extreme disaster events in vulnerable areas of the United States provides an opportunity to bring all sectors of society to the table to enhance our national resilience. A successful national strategy must build upon existing doctrine, such as the National Response, Disaster Recovery, and Mitigation Frameworks, to harness the collective resources and capabilities of the Whole Community, and to create incentives that lead us to a path forward to strengthen the security of our Nation throughout the 21st century.

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