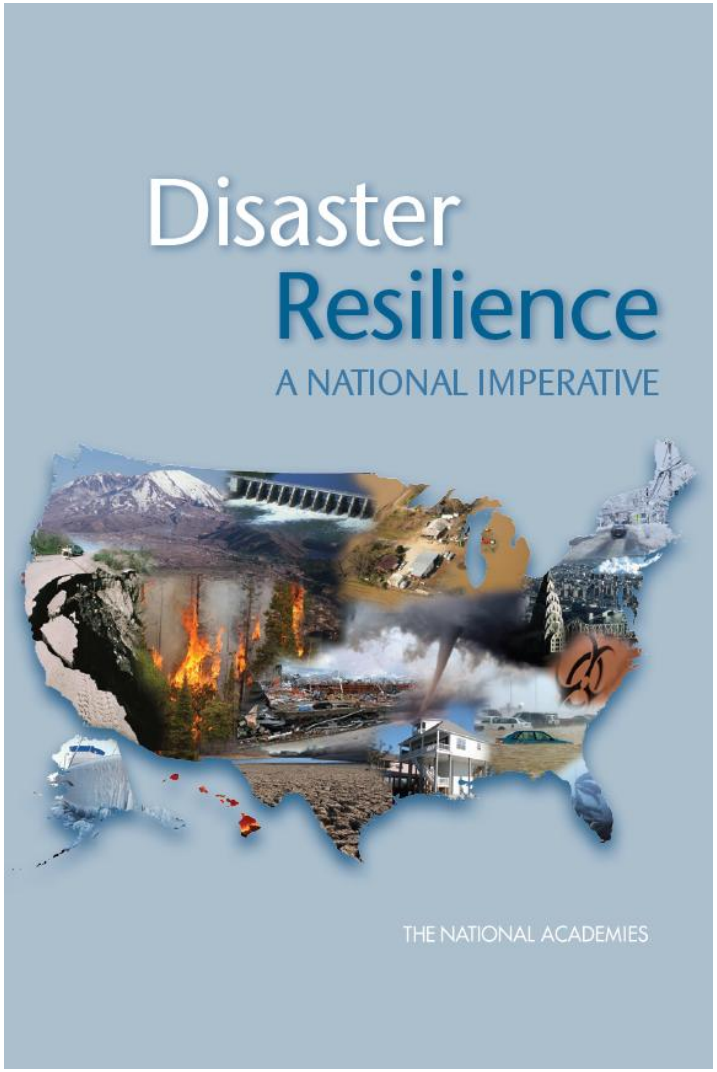

Disaster Resilience: A National Imperative

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Oak Ridge National Laboratory and the Community and Regional Resilience Institute

Overseen by the Committee on Science, Engineering, and Public Policy and the Disasters Roundtable of the National Research Council

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Committee on Increasing National Resilience to Hazards and Disasters

Susan L. Cutter, *chair*, *University of South Carolina, Columbia, SC*
Joseph A. "Bud" Ahearn, *CH2M Hill Ltd., Greenwood Village, CO*
Bernard Amadei, *University of Colorado at Boulder, CO*
Patrick Crawford, *Feeding America, Chicago, IL*
Gerald E. Galloway, *University of Maryland, College Park, MD*
Michael F. Goodchild, *University of California, Santa Barbara, CA*
Howard C. Kunreuther, *University of Pennsylvania, Philadelphia, PA*
Meredith Li-Vollmer, *Public Health Seattle & King County, Washington*
Monica Schoch-Spana, *University of Pittsburgh Medical Center, Baltimore, MD*
Susan C. Scrimshaw, *The Sage Colleges, Troy, NY*
Ellis M. Stanley, Sr., *Dewberry, Los Angeles, CA*
Gene Whitney, *Congressional Research Service (retired), Washington, DC*
Mary Lou Zoback, *Stanford University, Stanford,CA*

NRC Staff
Lauren Alexander-Augustine, Director, Disasters Roundtable
Eric J. Edkin, Senior Program Associate
Elizabeth A. Eide, Study Director
Neeraj Gorkhaly, Research Associate

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What is the Problem: The Need for a Resilient Nation

Photo: Joplin, MO after the May 22, 2011 tornado
Source: Charlie Ridel/AP Photo

- Beyond the unquantifiable costs of injury and loss of life from disasters, statistics for 2011 alone indicate economic damages from natural disasters in the United States exceeded $55 billion, with 14 events costing more than $1 billion in damages each.

- No person or place is immune from disasters or disaster-related losses.

- Communities and the nation face difficult fiscal, social, cultural, and environmental choices about the best ways to ensure security and quality of life against natural and human-induced disasters.

Where are We Now?

- A collective body of knowledge indicates that losses related to disasters could be reduced through increased national resilience to both hazards and disasters.

- A proactive approach to disasters that builds resilience will be more effective at reducing losses of life, property, and economic productivity than our current approach.

- Such an approach builds upon the rich, existing body of technical, scientific, and practical knowledge about hazards and disasters—causes, effects, preparedness and planning, response, recovery, and mitigation.

Photo: Gulfport, MS after Hurricane Katrina in 2005
Source: NOAA

The Choice:
Proceed with the Status Quo OR Become More Resilient?

- Disasters continue to occur, both natural and human-made, throughout the country; costs of responding continue to rise
- More people are moving to coasts and southern regions – higher exposure to drought and hurricanes
- Population continues to grow and age
- Public infrastructure is aging beyond acceptable design limits
- Economic and social systems are becoming increasingly interdependent
- Risk can not be completely eliminated; residual risk must be managed
- Impacts of climate change and environmental degradation of natural defenses such as coastal wetlands make the nation more vulnerable

What is Resilience?

The ability to prepare and plan for, absorb, recover from, or more successfully adapt to actual or potential adverse events

Photo: Cedar Rapids, IA during the 2008 flooding
Source: AP photo/Jeff Robertson

Characteristics of a Resilient Nation in 2030

- Individuals and communities are their own first line of defense against disasters.
- National leadership in resilience exists throughout federal agencies and Congress.
- Community-led resilience efforts receive federal, state, and regional investment and support.
- Site-specific risk information is readily available, transparent, and effectively communicated.
- Zoning ordinances are enacted and enforced. Building codes and retrofit standards are widely adopted and enforced.
- A significant proportion of post-disaster recovery is funded through private capital and insurance payouts.
- Insurance premiums are risk based.
- Community coalitions have contingency plans to provide service particularly to the most vulnerable populations during recovery.
- Post-disaster recovery is accelerated by infrastructure redundancy and upgrades.

A resilient nation in 2030 also has a vibrant and diverse economy and a safer, healthier, and better educated citizenry than in previous generations.

Statement of Task

An ad hoc committee overseen by the Disasters Roundtable and the Committee on Science, Engineering, and Public Policy (COSEPUP) will conduct a study and issue a consensus report that integrates information from the natural, physical, technical, economic, and social sciences to identify ways in which to increase national resilience to hazards and disasters in the United States. In this context, "national resilience" includes resilience at federal, state and local community levels.

The ad-hoc committee will:

- Define "national resilience" and frame the primary issues related to increasing national resilience to hazards and disasters in the United States;
- Provide goals, baseline conditions, or performance metrics for resilience at the U.S. national level;
- Describe the state of knowledge about resilience to hazards and disasters in the United States;
- Outline additional information or data and gaps and obstacles to action that need to be addressed in order to increase resilience to hazards and disasters in the United States;
- Present conclusions and recommendations about what approaches are needed to elevate national resilience to hazards and disasters in the United States.

2. Understanding, Managing, and Reducing Disaster Risks

Reducing risk requires a disciplined process of identifying risk, developing and implementing a strategy to deal with that risk, and keeping that strategy up to date.

- Risk assessment, risk perception, and behavioral responses to uncertainty are critical to managing risk.

- Risk management involves a range of interacting parties: federal, state, local government; home- and business owners; emergency managers; construction industry; insurers; markets; and others.

- A variety of tools and approaches exist to manage disaster risk. These tools are complementary and can be used in conjunction.

Structural (construction-related): e.g., levees, dams, floodways, disaster-resistant construction, "smart" building, and well-enforced building codes

Nonstructural (nonconstruction-related): e.g., natural defenses, risk mapping, zoning ordinances, economic incentives, hazard forecasting/warning, insurance, and catastrophe bonds

3. Making the Case for Resilience Investments: The Scope of the Challenge

- Valuation of a community's assets—including the built environment and assets with social, cultural, and/or environmental value—is important to make resilience investment decisions.

- Knowing the patterns of disaster losses allows communities to understand where the impacts are the greatest and what factors drive their exposure and vulnerability.

- There is no accounting across agencies for the total cost to the nation each year of natural and human-made disasters.

- Demonstrating that community investments in resilience will yield measurable short- and long-term benefits is critical for sustained commitment to increasing resilience.

Photo: S.S. Hurricane Camille in Gulfport, MS in October 2005 after Hurricane Katrina
Source: Susan Cutter

Existing loss and inventory databases in the United States are useful for certain kinds of analyses, but improvement in measurements, accuracy, and consistency are needed.

4. Measuring Progress

Photo: Elevated home near Gulfport, MS
Source: E. Eide

The nation needs a consistent basis for measuring resilience that includes all of these dimensions.

- Existing national and international indicators measure different aspects of community systems and hazards.

- Comparison of the strengths and challenges of different frameworks for measuring resilience suggests the critical dimensions of a consistent resilience measurement system are:

  - the ability of critical infrastructure to continue to perform;
  - social factors (e.g., health, socioeconomic status) that enhance or limit a community's ability to recover;
  - indicators of the ability of buildings or structures to withstand different disasters (e.g., building codes, adopted and enforced);
  - factors that capture the special needs of individuals and groups.

5. Building Local Capacity—Resilience from the Bottom-Up

❑ Local conditions vary across the country; the nation's communities are unique. The risks faced by every community vary according to local hazards. However, there are steps all communities can take.

Photo: Fallon Paiute-Shoshone Tribal Administration doing emergency training, June 2012
Source: Casey Deshong/FEMA

Community resilience begins with strong local capacity.

Universal Bottom-Up Steps

- Engage the community in disaster policy planning
- Link public & private infrastructure performance to resilience goals
- Communicate risks, promote a culture of resilience
- Organize communities and families to prepare for disasters
- Adopt sound land-use practices and adopt and enforce building codes

❑ Community coalitions of local leaders from public and private sectors, with ties to and support from federal and state governments, and with local citizenry input , are important.

❑ Coalitions can be charged to assess the community's exposure and vulnerability to risk, to educate and communicate risk, and to evaluate and expand the community's capacity to handle risk.

6. The Landscape of Resilience Policy

- Strong governance at all levels is a key element of resilience and includes making consistent and complementary local, state, and federal policies.

- Policies designed to improve national resilience need to take the long-term view of community resilience to help avoid short-term expediencies that can diminish resilience.

- However, government policies and practices can have unintended consequences that negatively impact resilience.

- Gaps in policies and programs among federal agencies exist for all parts of the resilience process. These include disaster preparedness, response, recovery, mitigation, and adaptation, as well as research, planning, and community assistance.

- Gaps result from legislative authority within which agencies are directed to operate, lack of effective coordination of the roles and responsibilities, and lack of a unified resilience vision.

The nation does not have a overall vision or coordinating strategy for resilience. Implementation of PPD-8 will address some of these consistency and coordination issues.

7. Linking Communities and Governance to Increase Resilience

- Communities and the governance structures of which they are a part are complex, dynamic systems. Resilience to disasters requires that these multiple systems are robust and collaborative.

- Long-term shifts in physical and cultural approaches are needed. Increased resilience cannot be accomplished by simply adding a short-term cosmetic layer of policy or practice.

- Experience in the disaster management community suggests that linked bottom-up-top-down networks are important for managing risk and increasing resilience.

- Developing and maintaining community resilience requires identification of specific roles and responsibilities for government at all levels, the private sector, and local stakeholders.

Photo: Port of Los Angeles upgrade to address risk and sustainability
Source: Gerry Galloway

A necessary first step to strengthen the nation's resilience and provide the leadership to establish a national "culture of resilience" is a full and clear commitment to disaster resilience by the federal government.

Recommendations

***Recommendation 1*:** Federal government agencies should incorporate national resilience as an organizing principle to inform and guide the mission and actions of the federal government and the programs it supports at all levels.

***Recommendation 2*:** The public and private sectors in a community should work cooperatively to encourage commitment to and investment in a risk management strategy that includes complementary structural and nonstructural risk-reduction and risk-spreading measures or tools. Such tools might include an essential framework (codes, standards, and guidelines) that drives the critical structural functions of resilience and investment in risk-based pricing of insurance.

Recommendation 3: A national resource of disaster-related data should be established that documents injuries, loss of life, property loss, and impacts on economic activity. Such a database will support efforts to develop more quantitative risk models and better understand structural and social vulnerability to disasters.

Recommendations

Recommendation 4: The Department of Homeland Security in conjunction with other federal agencies, state and local partners, and professional groups should develop a National Resilience Scorecard.

Recommendation 5: Federal, state and local governments should support the creation and maintenance of broad-based community resilience coalitions at local and regional levels.

Recommendation 6**:** All federal agencies should ensure they are promoting and coordinating national resilience in their programs and policies. A resilience policy review and self-assessment within agencies and strong communication among agencies are keys to achieving this kind of coordination.

Disaster Resilience in America: Launching a National Conversation

November 30, 2012 in Washington D.C. (symposium and webcast)
Public event focused on developing a culture of resilience, moving from vision to action, and perspectives from Hurricane Sandy

January 14, 2013 Resilience and Sustainability Symposium
(sponsored by USEPA, NSF, NCSE, and Dow Chemical; Washington D.C.)

Jan. 15-17, 2013 Environmental Disasters: Science, Preparedness and Resilience
(National Council for Science and the Environment (NCSE) Annual meeting, Washington D.C.)

http://nas-sites.org/resilience/