



# Governance and Resilience

## *Challenges in Disaster Risk Reduction*

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(Photo above:) Hurricane Katrina in 2005 resulted in a critical infrastructure collapse that has shaped the way agencies now prepare for natural disasters.

**H**uman exposure to extreme weather events and to the global effects of man-made devastation is on the rise. From 2005 through 2015, disasters had an impact on more than 1.5 billion people, causing more than 700,000 deaths, 1.4 million injuries, and the destruction of 23 million homes (1).

The United Nations Development Program has attributed the increasing levels of disaster risk to poor governance combined with substantial population growth. Extreme weather phenomena—such as higher temperatures or intense precipitation, drought, or flooding—are projected to increase the numbers of people at risk. The development and application of good resilience governance can reduce the risks from disasters.

### Evolution of Approaches

Emergency management, state security, community resilience, and infrastructure protection are contemporary concepts. Before the Cold War, states did not have offices of emergency management. The Federal

Civil Defense Act of 1950 made each state's civil defense office primarily responsible for coordinating with its federal counterpart to share information on civil defense. By the 1980s, the role of state civil defense had expanded to address all hazards. States formed offices of emergency management to handle the increased responsibility for response and recovery.

Soon after the terrorist attacks of September

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Millard Caldwell (center) was the first Administrator of the Federal Civil Defense Administration, organized by President Harry S. Truman in 1950.



In 2001, states incorporated functions to address homeland security. The governmental reaction to Hurricane Katrina in 2005, however, revealed that the coordination of the responses to major disasters was ineffectual. The Katrina response deployed pre-emergency measures, followed by an ad hoc evacuation and security activities, but failed to meet the public needs. The applications of strategic leadership and the processes of governance not only were challenged but proved problematic, because they tended to be impulsive.

The White House and the Federal Emergency Management Agency therefore developed the Emergency Support Functions as part of the National Inci-

dent Management System. The goal was to delegate leadership roles to federal agencies and to facilitate coordination with related state agencies (2).

The U.S. Department of Transportation (DOT) was designated as a lead federal agency; state DOTs usually have the leadership role for all matters relating to transportation emergency management within the state. Transportation has far-reaching impacts on the structure and function of social and infrastructure systems. Communities typically identify transportation as a critical infrastructure sector—a lifeline—essential for bouncing back from any emergency.

### Unifying Activities

How are agencies planning and coordinating so that programs and services meet communities' requirements for critical services and associated infrastructure? Regional and multijurisdictional planning and coordination are essential for increasing security and resilience.

A general framework is emerging for community resilience governance and decision making before and after disruptions. Strategies for making the best decisions to prepare for and to recover from disruptions quickly, to manage highly varied stakeholder groups, and to strengthen performance after the event are as yet conceptual.



A lack of strategic coordination among federal, state, and local agencies created evacuation crises before, during, and after Hurricane Katrina.

These issues have made resilience a popular and pressing field for research. Applied research is needed to address the processes of governance and resilience by unifying government, community, and individual activities.

## What Is Governance?

The word *governance* derives from the Greek *kubernáo*, to steer. When associated with public good—or the “general welfare” cited in the U.S. Constitution—the purpose and definition of governance evolves with the needs of the people.

The early framers of the U.S. federal government disagreed on the definition of general welfare. According to Alexander Hamilton, the term was an open invitation to unlimited federal governance, because almost anything the government wanted to do could be categorized as general welfare. Abraham Lincoln limited the term: “...[T]he legitimate object of government is to do for the community of people whatever they need to have done, but cannot do at all, or cannot so well do for themselves in their separate capacities” (3).

This view opened opportunities for federal advances in infrastructure, such as building highways, airports, and seaports. Federal investments in infrastructure for the public good have incentivized private-sector investment.

More than a century later, economists and political scientists have redefined governance somewhat, and institutions such as the United Nations, the World Bank, and business have disseminated the new meaning, which embraces the “policies, processes, and rules for decision making” (4).

Governance today, therefore, is not necessarily a wholly government activity. A government is a formal body invested with the authority to make decisions in a given political system, jurisdiction, or environment. In contrast, governance pertains to decision making within the context of organizational guidelines and processes.

These decisions are important both for physical infrastructure and for societal resilience. Infrastructure decisions and their implementation provide the basic physical structures and facilities—such as buildings, roads, and power generation—that organizations need for the operation of their enterprises and activities. The social fabric of community, regional, national, and international affairs is equally critical to consider in the governance of disaster response and risk reduction (5–7).

The governance process centers on a governing body, whether the organization is a geopolitical entity such as a nation–state, a corporation such as a business or organization established as a legal



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entity, or a sociopolitical entity such as a community, tribe, or family. Governance comprises the rules, norms, and actions that each governing body applies to produce, sustain, and regulate decisions.

The coordination of public-sector authorities to leverage broader public- and private-sector resources for the greater good is another form of governance. In the following discussion, the term governance refers to decision making and cooperation, whether by government or by private-sector stakeholders.

## What Is Resilience?

People are the core of a community. Individuals often

Maryland’s Emergency Management Agency coordinated critical services to aid recovery after Superstorm Sandy in 2012.

The Seattle Interstate Highway in 1963. The Interstate system and other federal investments in infrastructure have bolstered private-sector investments.



PHOTO: SEATTLE MUNICIPAL ARCHIVES

State and local agencies joined community members to conduct search and rescue operations in Houston, Texas, after Hurricane Harvey in September 2017.



PHOTO: AVEN BRESTOL, FLORIDA FISH AND WILDLIFE

can recover to a near pre-event condition within hours or days, depending on the severity of the event and on their resourcefulness and agility. The American Psychological Association's Help Center describes resilience as "adaptation in the face of adversity" (8).

In other words, humans can be active after a major shock, helping one another to recover, and adapting to and coping with the surrounding chaos (9). Without the continuity of governance processes, however, people can experience social breakdown that will prolong the disruption and extend the period of recovery.

Disruptive events can cripple infrastructure and critical functions. In poorly governed communities,

the chaos stemming from disruptive events negatively influences the decision-making environment, often stalling decisions and foiling the best intentions of the decision makers.

Similar to the term governance, resilience is undergoing a shift in its connotation. Resilience is commonly understood to mean withstanding or bouncing back from any hazard or disaster. According to the National Research Council, "Individual, community, and national resilience is the ability to prepare and plan for, absorb, respond to, recover from, and more successfully adapt to adverse events" (10).

Both definitions consider individuals and communities. The role of people in decision making is crucial for determining what needs to be resilient and what resilience means within the community or region.

## Factors in Recovery

Planning for resilience occurs in government and in industry. The federal government has prepared continuity of operations (COOP) plans under National Security Presidential Directive 51, Homeland Security Presidential Directive 20, and the National Continuity Policy. These directives require an integrated, overlapping capability for continuity within the federal government. State governments also have prepared COOP or continuity of government plans for emergencies. Several studies under way are exploring governance and resilience in both the public and the private sectors, particularly for physical infrastructure resilience and recovery (11, 12).

The Federal Emergency Management Agency partnered with local utility technicians to fix downed electrical lines in Rockport, Texas, soon after Hurricane Harvey.



PHOTO: CHRISTOPHER MARSDORF, FLICKR



The St. Petersburg Emergency Management team prepares for Hurricane Irma in September 2017. Resilience planning initiatives take place at all levels of government.

Human factors also are crucial in successful recovery. Private-sector companies that depend on supply chains, for example, have considered human factors in focusing on the best means to ensure employee stability and business continuity during disruptive events.

In general, most research has focused on physical infrastructure, and many government agencies have spent heavily to protect facilities and operations, with little regard for the associated social resilience (13). Better understanding is needed about how decisions are structured, made, and implemented before, during, and after disruptions, including process maps at the individual and community levels for both the public and the private sectors.

The National Institute of Standards and Technology (NIST), part of the U.S. Department of Commerce, has investigated community and social resilience (14). NIST has found that collaborative planning in communities can improve the management of specific disaster risks and reduce the impacts of hazards. The prioritizing of resiliency measures can improve a community's ability to manage responses to prevailing hazards, to restore vital services, and to build back after disruptive events (12).

### Building Social Capital

In the context of disasters and emergencies, social capital helps determine a community's resilience (15). The Association of Neighborhoods and Housing Development, Inc., found that after Superstorm Sandy, strong social networks within many of New York City's communities enabled successful adap-

tation, response, and recovery (9). These social ties among people who knew and trusted one another emerged as a key factor in supporting restoration and recovery. Researchers in other locations also have found that social capital can hold a community together after a disruptive event (16).

The United Nations Development Program defines disaster risk governance as "the way in which public authorities, civil servants, media, private sector, and civil society at the community, national and regional levels cooperate...to manage and reduce disaster- and climate-related risks" (17). An Organisation for Economic Co-operation and Development

Direct Relief provides food and water to neighbors affected by Superstorm Sandy. Social capital—including physical and emotional support in times of disaster—is a key factor in community resilience.



**TABLE 1 Disaster Characteristics**

Characteristic	Lower Range	Lower Midrange	Upper Midrange	Upper Range
Temporal	Predictable or planned	Emerging	Rapid onset	Abrupt
Spatial	Local or community	Regional	National	International
Intensity	Low	High	Severe	Catastrophic

(OECD) study found that innovative risk governance can create resilience in the built environment and among stakeholders (18).

But what is innovative or good governance that increases resilience to disruptive events, and how should it be exercised? The OECD study identified several measures that can aid governments in boosting resilience—for example, inclusiveness, trust, cooperation, and sharing. These measures build social capital.

What then is the best way to incorporate the concept of social capital and its development into the formal governance processes that communities and other levels of government already have established?

**Disaster Characteristics**

Understanding the scale and character of a disaster is a first step in determining an appropriate framework for governance; a disaster’s characteristics define its distinctive threats (see Table 1, above). Governance may operate within a single organization, community, multilayered agency, or nation or at an international level. The combination of disaster and governance necessitates consideration of each circumstance to develop the proper approach to governance.

A disruptive event proceeds through four phases: pre-event, disruption, recovery, and postevent (see Figure 1, below).

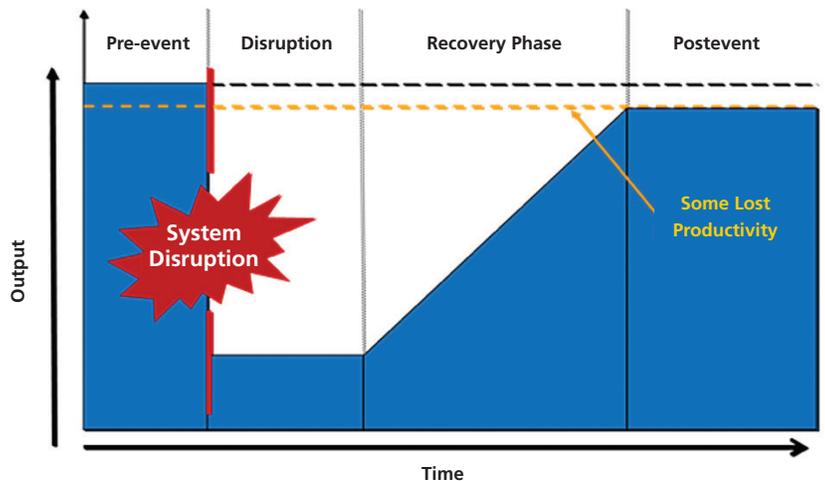
- ◆ The pre-event phase is relatively stable.
- ◆ The disruption itself is chaotic, with property damage and potential loss of life.
- ◆ Recovery is a period of rebuilding, but the physical environment—as well as the governance environment—is likely to be unstable and unreliable for many stakeholders.
- ◆ The postevent phase returns to normalcy, although productivity may be lower for a period.

Improved governance for resilience requires an understanding of these phases for each disaster.

**Governance Characteristics**

Governance frameworks can pose an obstacle to resilience. For example, governance and resilience at a seaport must function at the front line of sea level rise and global climate change. Private terminal operators may focus on preparedness for the next major storm or security event; in contrast, the port authority has broader and longer-term goals, such as adaptation to climate change.

Adaptation to climate change is not the same as preparing for the next major storm event but involves long-term strategies and long-term investments not likely to provide the terminal operator with an immediate return. The terminal operator’s vision of long-term resiliency seldom extends beyond the remaining years on the lease.



**FIGURE 1** Resilience curve.



To mitigate future flood risks in Ocean City, Maryland, the U.S. Army Corps of Engineers constructed a sea wall after Superstorm Sandy.

The port governance model must be integral to the effective implementation of a portwide resilience plan. Resilience planning within the seaport sector requires a thorough understanding of the motivations and goals of all the organizations involved and of the limitations of the port governance model. The ports that become the most resilient will have addressed the governance challenges directly, particularly in the context of lease agreements.

The governance and resilience environment of a coastal community and a neighboring military base, for example, must deal with the consequences of sea level rise. Community leaders may focus on mitigating the consequences of the next major storm, such as local flooding, and the military may have broader goals, such as mission assurance.

The military engineering division may address the risks by designing a sea wall to control water levels. Community leaders, however, may want to mitigate the risk of floods by installing a new drainage system to redirect flood waters away from housing—this is not the same as adapting to sea level rise with a sea wall. Nevertheless, both entities are spending resources to address the same regional disaster risk.

Typically a military base does not make decisions about mission assurance and resilience with consideration of the supporting community, nor does the community consult with the military base on community issues. If the community and military formed a regional governance body, how would risk reduction decisions be made?

The challenge in creating supportive governance frameworks is to address long-term adaptive strategies proactively to improve resilience instead of waiting until a crisis that forces decision makers to react. General models for governance to achieve resilience are still in development but should incorporate the characteristics of good or proper governance—such as disaster preparedness, resilience planning, cooperation, and consensus building at the individual and organizational levels (19). These characteristics enable individuals to react quickly and decisively when faced with a disaster (9).

The Texas National Guard works with regional governments and local agencies to speed recovery from Hurricane Harvey. Supportive governance frameworks must address strategies proactively and coordinate community authorities and other groups like the military.





The New York City Transit Authority moves subway cars to a new location to allow partial train service and repair tracks damaged by Superstorm Sandy.

## Areas for Research

Good resilience governance addresses not only infrastructure protection and governmental responses but also the reaction and recovery of the people who are affected. Considerable evidence indicates that social capital is critical in enhancing the resilience of impacted communities, but additional research would help inform the extent to which social capital is needed.

More research also can provide insights into decision-making processes and organizational models for governments—at the regional, state, or community levels—and for private organizations to apply before, during, and after events. Research could identify desirable governance processes and guidelines for public- and private-sector collaboration to build community resilience.

As concerns increase about disaster risks and their potential impacts on world populations, research is needed to address questions and to advance answers about efficient and effective approaches to governance and resilience.

## References

1. Galperin, A., and E. Wilkinson. *Strengthening Disaster Risk Governance: United Nations Development Program Support During the HEA Implementation Period, 2005–2015*. New York, 2015. [www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/strengthening-disaster-risk-governance.html](http://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/strengthening-disaster-risk-governance.html).
2. *Federal Emergency Management Agency Incident Command System*. U.S. Department of Homeland Security, Washington, D.C. <https://www.fema.gov/incident-command-system-resources>.
3. Lincoln, A. *Fragment of Government: Lincoln's Writings, Ranking 103, July 1, 1854*. <http://housedivided.dickinson.edu/sites/lincoln/fragment-on-government-july-1-1854/>.
4. *Business Dictionary*. WebFinance, Inc., 2016. [www.business-](http://www.business-dictionary.com/definition/governance.html)

[dictionary.com/definition/governance.html](http://www.business-dictionary.com/definition/governance.html).

5. Aldrich, D. P. *Building Resilience: Social Capital in Post-Disaster Recovery*. University of Chicago Press, Chicago, Ill., 2012.
6. Nakagawa, Y., and R. Shaw. Social Capital: A Missing Link to Disaster Recovery. *International Journal of Mass Emergencies and Disasters*, Vol. 22, No. 1, pp. 5–34, 2004. [www.alnap.org/pool/files/socialcapital2004.pdf](http://www.alnap.org/pool/files/socialcapital2004.pdf).
7. Tompson, T., J. Benz, J. Agiesta, K. Cagney, and M. Meit. *Resilience in the Wake of Superstorm Sandy*. Associated Press–NORC Center for Public Affairs Research, University of Chicago, Chicago, Ill., 2013. [www.apnorc.org/about-the-center/pages/default.aspx](http://www.apnorc.org/about-the-center/pages/default.aspx).
8. APA Help Center. *The Road to Resilience*. American Psychological Association, Washington, D.C., 2017. [www.apa.org/helpcenter/road-resilience.aspx](http://www.apa.org/helpcenter/road-resilience.aspx).
9. Williams, E. *Social Resiliency and Superstorm Sandy: Lessons from New York City Community Organizations*. Association for Neighborhood and Housing Development, Inc., New York, 2015. [www.anhd.org/wp-content/uploads/2011/07/Social-Resiliency-and-Superstorm-Sandy-11-14.pdf](http://www.anhd.org/wp-content/uploads/2011/07/Social-Resiliency-and-Superstorm-Sandy-11-14.pdf).
10. *Resilience @ the Academies*. National Academies of Sciences, Engineering, and Medicine, Washington, D.C., 2016. [www.nationalacademies.org/topics/resilience/](http://www.nationalacademies.org/topics/resilience/).
11. de Stasio, C., C. Chiffi, A. Sitran, R. Parolin, S. Maffi, C. Doll, L. Mejia-Dorantes, K. Watchter, G. Horton, M. Biedka, H. Bruhova, and I. Skinner. *Transport Infrastructure: Research Theme Analysis Report*. European Commission, Brussels, Belgium, 2017. [www.transport-research.info/theme-analysis-reports](http://www.transport-research.info/theme-analysis-reports).
12. Stanley, W., S. Gilbert, D. Butry, J. Helgeson, and R. Chapman. *Community Resilience Economic Decision Guide for Buildings and Infrastructure Systems*. NIST Special Publication 1197, National Institute of Standards and Technology, U.S. Department of Commerce, Washington, D.C., 2015. <http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1197.pdf>.
13. Aldrich, D. P., and M. Meyer. Social Capital and Community Resilience. *American Behavioral Scientist*, Vol. 59, No. 2, pp. 245–269, 2014.
14. Cauffman, S. *Community Resilience Guide*. National Institute of Standards and Technology, U.S. Department of Commerce, Washington, D.C., 2015. <https://www.nist.gov/el/resilience/community-resilience-planning-guide>.
15. Sadeka, S., M. S. Mohamad, M. I. Reza, J. Manap, and M. K. Sarkar. Social Capital and Disaster Preparedness: Conceptual Framework and Linkage. *Social Science Research*, Vol. 3, pp. 38–48, 2015. <https://worldconferences.net/journals/icssr/vol3/IC%20061%20SOCIAL%20CAPITAL%20AND%20DISASTER%20PREPAREDNESS%20-%20SUMAIYA.pdf>.
16. Aldrich, D. P., and Y. Sawada. The Physical and Social Determinants of Mortality in the 3.11 Tsunami. *Social Science and Medicine*, Vol. 124, pp. 66–75, 2015.
17. *Disaster Risk Governance: Issue Brief*. United Nations Development Programme, New York, 2013. [www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/issue-brief--disasters-governance.html](http://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/issue-brief--disasters-governance.html).
18. *Boosting Resilience Through Innovative Risk Governance*. Organisation for Economic Co-operation and Development, Paris, 2014. <http://dx.doi.org/10.1787/9789264209114-en>.
19. Wakeman, T., and J. Miller. *Lessons Learned from Hurricane Sandy for Port Resilience*. Technical Report Series, University Transportation Research Center, Region II, City University of New York, 2013. [www.utrc2.org/publications/hurricane-sandy-port-resilience](http://www.utrc2.org/publications/hurricane-sandy-port-resilience).