



After Great Disasters

How Six Countries Managed Community Recovery



POLICY FOCUS REPORT SERIES

The Policy Focus Report series is published by the Lincoln Institute of Land Policy to address timely public policy issues relating to land use, land markets, and property taxation. Each report is designed to bridge the gap between theory and practice by combining research findings, case studies, and contributions from scholars in a variety of academic disciplines, and information from professional practitioners, local officials, and citizens in diverse communities.

ABOUT THIS REPORT

The aftermath of great natural disasters and the management of the recovery process impact the lives of citizens and can change the future of a city or region forever. Post-disaster reconstruction can offer opportunities to fix long-standing problems: to improve construction and design standards, renew infrastructure, create new land-use arrangements, reinvent economies, and improve governance. This report identifies lessons from different parts of the world to help communities and government leaders better organize for recovery after disasters.

This report distills lessons from six countries that have faced significant disaster recovery challenges and employed different management approaches. A set of recommendations provides guidance to governments faced with the challenges of recovering from a large disaster. The recommendations reflect a common set of core principles: primacy of information, stakeholder involvement, and transparency. If done well, reconstruction can help break the cycle of disaster-related impacts and losses, and improve the resilience of a city or region.



LINCOLN INSTITUTE
OF LAND POLICY

113 Brattle Street, Cambridge, MA
02138-3400, USA

P (617) 661-3016 or (800) 526-3873

F (617) 661-7235 or (800) 526-3944

help@lincolninst.edu

lincolninst.edu

ISBN 978-1-55844-338-9 (paper)

ISBN 978-1-55844-358-7 (pdf)

Policy Focus Report/Code PF041

Front Cover: (top) In January 1995, fires erupted, buildings collapsed, and thousands died when a magnitude 6.9 earthquake struck Kobe, Japan. © Asahi Shimbun via Getty Images. Used with permission. The 2005 view of the restored Kobe **(bottom)** was published with the 1995 photo in *The Times-Picayune* to illustrate the potential for urban reconstruction. Robert Olshansky, along with Ikuo Kobayashi and Kazuyoshi Ohnishi, arranged for the photographer to replicate the famous 1995 view of Kobe in flames. Photo by Ted Jackson. © 2014 NOLA Media Group, L.L.C. All rights reserved. Used with permission of *The Times-Picayune* and NOLA.com.

Copyright © 2016 Lincoln Institute of Land Policy
All rights reserved.

Contents

3 Executive Summary

6 Chapter 1 Introduction

- 7 The Process and Management of Post-Disaster Recovery
- 10 Distinguishing Recovery from Normal Times
- 11 The Role of Planning and Planners
- 13 The Cases

14 Chapter 2 China: Top-Down, Fast-Paced Reconstruction

- 15 The 2008 Wenchuan Earthquake
- 15 Organizing for Recovery
- 17 Notable Recovery Features
- 19 Lessons

20 Chapter 3 New Zealand: Centralizing Governance and Transforming Cityscapes

- 21 The 2010 and 2011 Canterbury Earthquakes
- 21 Organizing for Recovery
- 24 Notable Recovery Features
- 26 Lessons

27 Chapter 4 Japan: National Land-Use Regulations Drive Recovery

- 28 The 1995 Kobe Earthquake
- 28 Organizing for Recovery
- 30 Notable Recovery Features
- 31 The 2011 Tohoku Earthquake and Tsunami
- 32 Organizing for Recovery
- 34 Notable Recovery Features
- 35 Lessons from the Kobe and Tohoku Disasters



6



14



20



27

36 Chapter 5 India: State-Managed Recovery with NGO Involvement

- 37 The 2001 Gujarat Earthquake
- 37 Organizing for Recovery
- 37 Notable Recovery Features
- 40 Lessons



36

41 Chapter 6 Indonesia: Centrally Managed, Community-Driven Approaches to Reconstruction

- 42 The 2004 Sumatra Earthquake and Tsunami
- 42 Organizing for Recovery
- 44 Notable Recovery Features
- 46 Lessons



41

47 Chapter 7 United States: An Evolving National Recovery Policy Centralized at Federal and State Levels

- 48 The 2001 World Trade Center Disaster
- 48 Organizing for Recovery
- 49 Notable Recovery Features
- 50 The 2005 Hurricanes Katrina and Rita
- 50 Organizing for Recovery
- 51 Notable Recovery Features
- 53 The 2012 Hurricane Sandy
- 53 Organizing for Recovery
- 54 Notable Recovery Features
- 56 Lessons from the 2001, 2005, and 2012 Disasters



47

57 Chapter 8 Conclusions and Recommendations

- 57 The Challenges of Recovery
- 60 Recommendations for Recovery
- 62 Conclusion

64 References

70 Acknowledgments

71 About the Authors

72 About the Lincoln Institute of Land Policy

73 Ordering Information



57

Executive Summary



Great natural disasters are rare, but when they occur, the aftermath can change the fortunes of a city or region forever. The process of recovery and its management can affect both the intensity and duration of the experience. Post-disaster reconstruction can offer opportunities to fix long-standing problems: to improve construction and design standards, renew infrastructure, create new land-use arrangements, reinvent economies, and improve governance. If done well, reconstruction can help break the cycle of disaster-related impacts and losses, and improve the resilience of a city or region.

This neighborhood park, located in the north Rokkomichi area of eastern Kobe, was constructed as part of a land-readjustment project to widen roads and add neighborhood-level disaster services following the 1995 earthquake. The park includes an auxiliary water supply for fire-fighting, emergency latrines, and a community meeting center stocked with post-disaster supplies.
Source: L. Johnson (2013).



Unfortunately, there is little systematic knowledge of how to make recovery work well. When a catastrophic disaster strikes, leaders of affected communities know that they lack relevant experience, and they seek lessons from others. Typically, they muddle through, innovate, and learn as they go. But later, many note that their recovery could have been faster, better, and easier if they knew then what they have since learned. Given the growing number of disaster recovery experiences, the time is ripe for organizing and synthesizing common lessons.

The purpose of this report and forthcoming book is to identify lessons from various parts of the world to help communities and government leaders better organize for recovery after disasters. The research cited here looks at a range of countries that have faced significant recovery challenges and employed different management approaches within various governmental contexts. Each country tried to meet the time-sensitive demands of decision making while also maximizing the opportunity for community betterment. In the aftermath of devastating earthquakes, China and New Zealand centralized recovery management and policy creation at the national government level. Following

Housing reconstruction in New Orleans, Louisiana, was funded in part by Louisiana's Road Home program. These homes in the Lower Ninth Ward received planning and financial support from the Make It Right Foundation. *Source: L. Johnson (2009).*

the 1995 and 2011 earthquakes, Japan maintained tight coordination at the national government level as well, but also partly decentralized recovery management and policy making across multiple levels of government. India, Indonesia, and the United States took more decentralized approaches following an array of large disasters. In these cases, national and state governments provided coordination and support to multiple levels of government and organizations involved in recovery management and policy making. These governments faced considerable uncertainty and had to balance the tensions between speed and the need for deliberation, and between restoration and betterment.

A major goal of recovery management should be to reduce this uncertainty by finding funds, establishing clear procedures, streamlining bureaucratic processes, providing public information, and involving all

stakeholders so they can help inform good decision making and policy design. Participation provides communities with the information and clarity to act. A recovery organization can help to reduce uncertainty if it has the authority to facilitate or compel agencies to cooperate more effectively. The following set of recommendations provides guidance to governments faced with the challenges of recovery. Many of the recommendations overlap; collectively, they reflect a common set of principles: primacy of information, stakeholder involvement, and transparency.

- Enhance existing government systems and structures to promote information flow and collaboration, rather than using valuable time to establish new methods.
- Emphasize data management, communication, transparency, and accountability in recovery design, management, policies, and actions.
- Plan and act simultaneously while monitoring, evaluating, and correcting.
- Budget for the costs of communication and planning. Prepare to revise budgets during the process, as time compression creates a high probability of mistakes.
- Increase capacity and empower local governments to implement recovery actions.
- Avoid permanent relocation of residents and communities except in rare instances when public safety and welfare are at risk, and only with full participation of residents.
- Although speed is important, reconstruction should not be a race. Reconstruct quickly, but do not rush.

Recovery after great disaster is always complex, takes a very long time, and never occurs fast enough for affected residents. However, the process can be improved by setting more realistic expectations at the outset, working to restore communities and economies quickly and equitably, empowering stakeholders to participate in the process, improving pre-existing problems, ensuring governance for

recovery over the long term, and reducing the risk of future disasters. Even better than smart recovery, however, is thinking ahead about strategies for future disasters. Foresight improves community resilience: the ability of the community to survive, adapt, and recover from extreme events.

This totem pole in the center of Kaiapoi, New Zealand, is made from mailboxes from homes purchased by the national government as part of its post-earthquake “red zone” voluntary buyout of more than 7,000 damaged properties. Mark Larsen and the Rubble Rousers, creators of the artwork, included the former street names of one of the buyout neighborhoods.

Source: L. Johnson (2015).



CHAPTER 1

Introduction



Hurricane Sandy damaged many homes along the New Jersey shore after making landfall there on October 29, 2012. *Source: L. Johnson (2013).*

Imagine for a moment that you are a political leader—a prime minister, president, or governor—and you awaken to the news that natural disaster has struck. Citizens died, buildings collapsed, infrastructure is hobbled, and local leaders desperately need additional resources and support. You respond immediately, sending personnel and equipment to the disaster zone and pledging additional assistance to local leaders. Yet within days, even hours, the media and leaders are demanding answers to questions you haven't had time to consider.

They ask how much money will be pledged to the rebuilding? What standards will guide the work? Will all landowners be permitted to rebuild? Will there be enough housing for renters? How will the local economy be reconstructed? Who will lead the process? Is a new institution or governance structure needed to cut through bureaucratic red tape and expedite the rebuilding?

This report summarizes the research on the roles of various government levels in successful disaster recovery and rebuilding around the world. Its purpose is to find common lessons in these disparate environments to facilitate recovery for communities struck by disasters.

The Process and Management of Post-Disaster Recovery

The aftermath of large disasters can change the future of a city or region—for good or ill. Chicago and San Francisco became more successful cities after being destroyed by fire and earthquake, and Tokyo successfully survived devastating fires from earthquake and war. However, the city center of Managua, Nicaragua, never recovered from a 1972 earthquake, and Galveston, Texas, lost its relevance as a major U.S. port after being destroyed by a great hurricane in 1900.

The process of recovery is a major aspect of disaster, and its management greatly impacts citizens. Such catastrophes disrupt lives and businesses, as people await assistance, infrastructure repair, and the return of their neighbors. Management of recovery matters because the aftereffects of disasters extend over time. Many people survive the initial disaster but then suffer from the recovery as the economy stagnates, social networks weaken, and health care and support services decline. The physical recovery from disasters takes many years and the psychological scars can last for decades.

Post-disaster reconstruction can offer opportunities for betterment and for fixing long-standing problems: to renew infrastructure, create new land-use arrangements, improve construction and design standards, reinvent economies, and improve governance. Reconstruction can present a chance to reduce the effects of future disasters by improving construction quality, avoiding hazardous locations, and improving community awareness and preparedness.

Until now, there has been little systematic understanding of how to make recovery work. When a catastrophic disaster strikes, the leaders of the affected communities often recognize that they lack relevant experience, so they seek lessons from others.

In the past 40 years, a number of serious international disasters have required large-scale and sustained intervention by multiple levels of government and nongovernmental organizations. In our globalized world, communities increasingly benefit from the assistance of those who have recent experience with disasters in other places. Given this growing collection of recovery experiences, the time is ripe for organizing and synthesizing common lessons. We now have enough examples to develop transferable theories about the process of rebuilding human settlements after disasters.

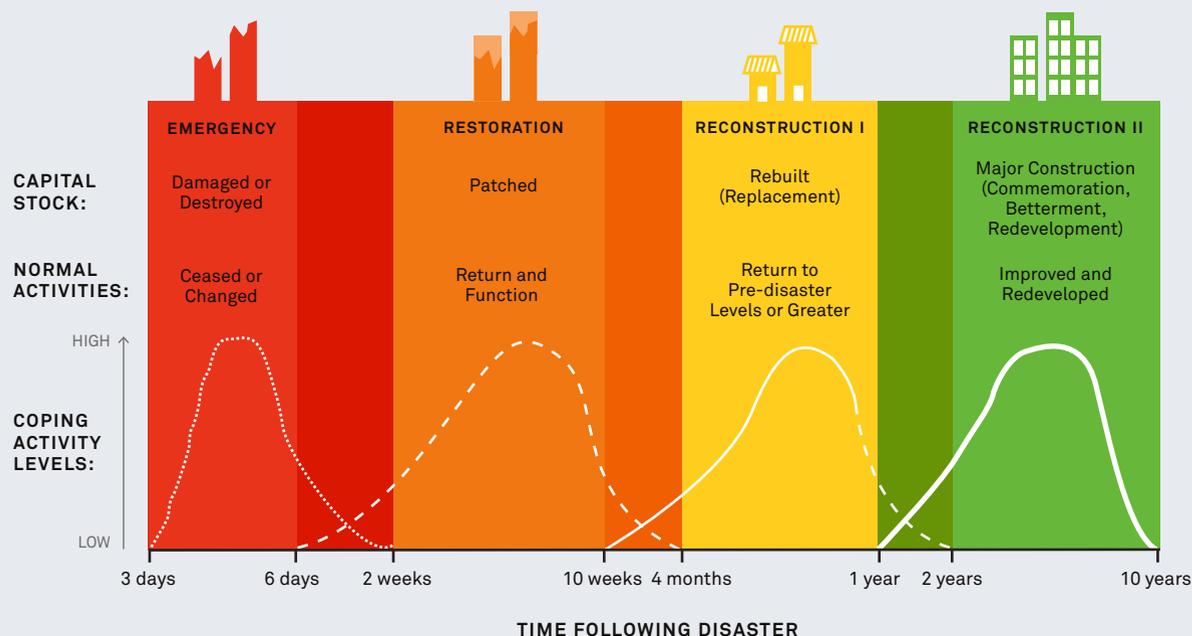
RECOVERY AS A PROCESS

Reconstruction Following Disaster by Haas, Kates, and Bowden (1977), was the first study to take a comprehensive, long-term view of disaster recovery. It focused on rebuilding the cities of San Francisco, California; Anchorage, Alaska; and Managua, Nicaragua following the 1906, 1964, and 1972 earthquakes, respectively. The authors proposed that recovery progresses through four distinct but overlapping periods—emergency, restoration, replacement reconstruction, and major reconstruction involving betterment and commemoration (figure 1).

Although subsequent scholars have questioned this ordered, sequential model of recovery, *Reconstruction Following Disaster* offers considerable wisdom. In particular, the authors estimated that it takes more than two years to attain pre-disaster levels of capital stock and activities, and it can take 10 years or longer to complete major reconstruction. In other words, it is generally much faster to restore and rebuild what existed before the disaster than it is to make changes in land uses and urban patterns and to reconstruct differently in the wake of disaster.

After disaster, there is a tension between change and a return to normalcy. The authors observed that, “There is already a plan for reconstruction, indelibly stamped in the perception of each resident—the plan of the pre-disaster city. The new studies, plans, and designs compete with the old” (Haas, Kates, and Bowden 1977, 268). Using the cases of Chicago, Boston, and Baltimore, Rosen (1986) demonstrated that change is difficult after disasters, despite public intentions for betterment, because there are multiple stakeholders with property interests, complex webs of incentives embedded in real estate markets, structural and topo-

Figure 1
Disaster Recovery Timeline



A model recovery timeline first proposed by Haas, Kates, and Bowden identified four overlapping periods of recovery-related activities, each lasting significantly longer than the previous ones. Source: Haas, Kates, and Bowden (1977).

graphic constraints, and competition among numerous public and private interests for urban space.

COMMUNITIES AS SYSTEMS OF SYSTEMS

Increasingly, scholars are describing communities as self-organizing, complex, adaptive systems “. . . that adapt to change and increase in complexity through time without being guided or managed by an outside source” (Alesch, Arendt, and Holly 2009, 18). In normal times, city building involves many individuals, organizations, and institutions, and the same is true after a disaster. Participants act according to their own needs, constrained by the historic artifacts of infrastructure and property rates within contexts of the physical environment, economic issues, social forces, interpersonal relationships, and politics. All of the actors plan, communicate, and act at the same time as they try to restore housing, livelihoods, community infrastructure, and the economy.

Recovery is a process rather than an outcome, and it is best accomplished at local levels.

Recovery happens, say Alesch et al., when the community repairs itself as a functioning system, and likely a system that is different from the original one. Furthermore, segments of the community will recover at different rates; some may not recover at all. Because the chain of post-disaster events is difficult to predict, the most important quality of a community is its ability to adapt to changing circumstances. Although the extent of damage and the availability of financial and human resources are important, the authors say that communities with a high collective efficacy—those who see themselves as self-organizing and not reliant on others—are most likely to recover.

The phenomena of complex community systems described by the authors are amply illustrated by Rosen (1986) and by Mammen (2011) in his account of Lower Manhattan after the terrorist attacks of September 11, 2001. Both Rubin (1985)—in a study of 14 communities after disaster—and Mammen emphasize the importance of local leadership in successful recovery. According to Rubin, key leadership qualities include flexibility and creativity, a vision for the community, the ability to attract competent assistance, and strong connections to other decision makers in the public and private sectors.

A DECENTRALIZED PROCESS OF SELF-ORGANIZING SYSTEMS

“Recovery management” is shorthand for something more complex: a decentralized process that involves organization, coordination, and communication by a variety of actors. Rubin points to the need for strong coordination among the various levels of government and nongovernment organizations. Smith and Birkland (2012) call this the “disaster recovery assistance framework,” which is “a fragmented network of different stakeholder groups who provide disaster recovery assistance” (48).

Rubin called for higher levels of government to assist local officials in a more collaborative way. Twenty seven years later, Smith and Birkland asked for the same: “When community members are actively engaged in formulating a disaster recovery strategy . . . they are empowered to act rather than play the role of passive ‘disaster victims’ on whom assistance is imposed” (156–157). They conclude that “. . . moving from hierarchical, rule-bound systems of disaster recovery to networked, cooperative, nonhierarchical systems could, if adopted, significantly improve recovery processes and outcomes after major or ‘catastrophic’ disasters” (164).



The “Info Gap,” developed by students at the University of Technology, Sydney, is one of many temporary art exhibits erected on vacant sites in the heavily damaged downtown in Christchurch, New Zealand following the February 2011 earthquake. The exhibit presents regeneration ideas for the destroyed Peterborough Village. *Source: L. Johnson (2012).*

Recovery is a process rather than an outcome, and it is best accomplished at local levels. Assistance—in the form of money, manpower, and information from outside sources and from higher levels of government—is vital. But that assistance should empower recovery actors rather than prescribe recovery actions. This may be viewed as an ecosystem of builders being fed resources—money and information—from the outside (Olshansky, Hopkins, and Johnson 2012).

All of this resonates with Innes and Booher’s (2010) description of resilient communities. Their work, based on studies of regional environmental problem solving, concludes that resilience is about a process rather than an endpoint. A resilient system, they say, is a self-organizing, complex, adaptive system with networks, distributed decision making, monitoring and feedback systems, respect for stakeholder opinions, and governments that mobilize actors and facilitate the process.

THE ROLE OF GOVERNMENT

Government is not the main actor in recovery, but it is an important one. It is uniquely positioned to provide leadership, mobilize financial resources, provide technical assistance to public and private actors, and invest in infrastructure and public facilities. Government can become a credible data repository and serve as a focal point of communications. In these ways, government can support and even catalyze the actions of all the other recovery actors.

Distinguishing Recovery from Normal Times

What is unique about post-disaster recovery compared to normal community management processes and city building? Every detailed account of reconstruction decision making that follows disasters—especially great disasters—describes chaos and confusion among participants. People describe a sense of disorientation and a feeling of operating in an abnormal and unfamiliar environment.

TIME COMPRESSION

The key characteristic that distinguishes post-disaster conditions from normal times is the compression of

time. “Stated simply, the post-disaster environment consists of a compression of urban development activities in time and in a limited space” (Olshansky, Hopkins, and Johnson 2012, 173). Other researchers describe time compression as *one* of the characteristics of post-disaster recovery, but it is *the* predominant characteristic and is, therefore, the key to understanding recovery. Furthermore, time compresses unevenly across various physical, social, economic, and institutional systems in communities. The world of post-disaster recovery becomes a different world, where the community does not function as it does in normal times or in normal places (figures 2 and 3).

Self-help can sometimes facilitate reconstruction more rapidly than governmental assistance can. The widely observed emergence of nongovernmental organizations (NGOs) after disasters is another manifestation of time compression. New organizations emerge to meet the increased technical, informational, and communication-related demands that bureaucracies cannot easily address.

The compression of time also has important implications for post-disaster organizational design. The rate of communications must increase to accommodate the volume of activities during the compressed period. The solution is to create organizations that provide more communication channels between recovery actors.

THE TENSION BETWEEN SPEED AND DELIBERATION

One of the central characteristics of recovery is the tension between speed and deliberation: between rebuilding as quickly as possible or slowing down to develop comprehensive plans for betterment. In practice, speed is difficult to resist because many actors want to rebuild as quickly as possible. The key is to deliberate more efficiently within the constraints of compressed time.

One solution is iteration or focusing on the easiest, most expedient recovery decisions first, then later turning attention to decisions that require more deliberation. Another is to increase planning capacity by adding personnel or technical assistance to the planning processes. A third solution is to decentralize and create multiple paths for simultaneous recovery planning and decision making.

The Role of Planning and Planners

Plans and planners play critical roles after disasters. All the recovery actors—individuals and organizations—need plans to guide their actions and persuade others to support their decisions financially, politically, and bureaucratically. Government-sponsored plans can make the case that recovery is a good investment



Following Hurricane Katrina in 2005, the Unified New Orleans Plan involved residents in citywide congresses to discuss the overall vision. Groups also worked in smaller settings to identify priorities for neighborhood recovery. Source: L. Johnson (2006).

Figure 2

Impacts of Disasters on Capital Stock and Services

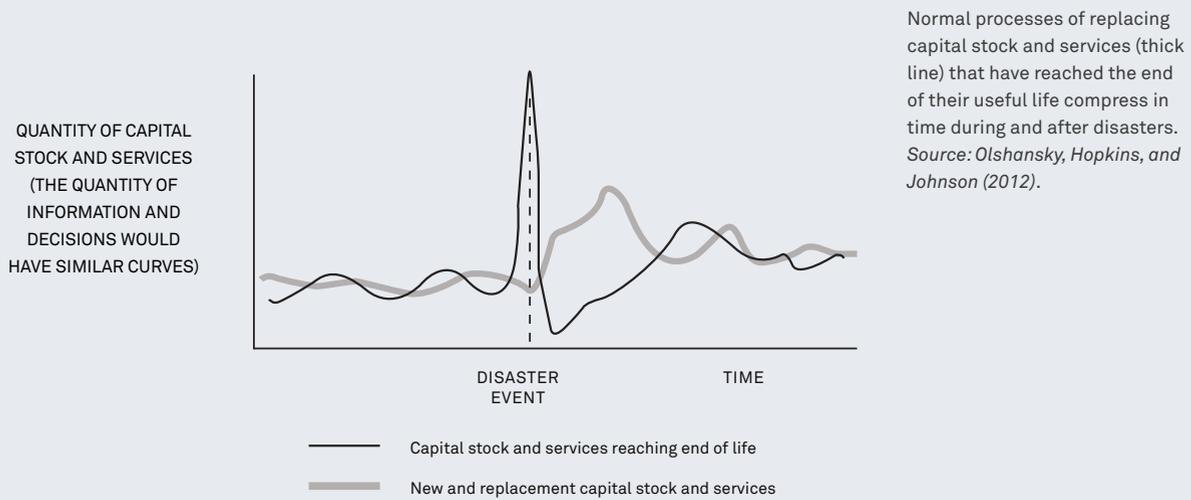
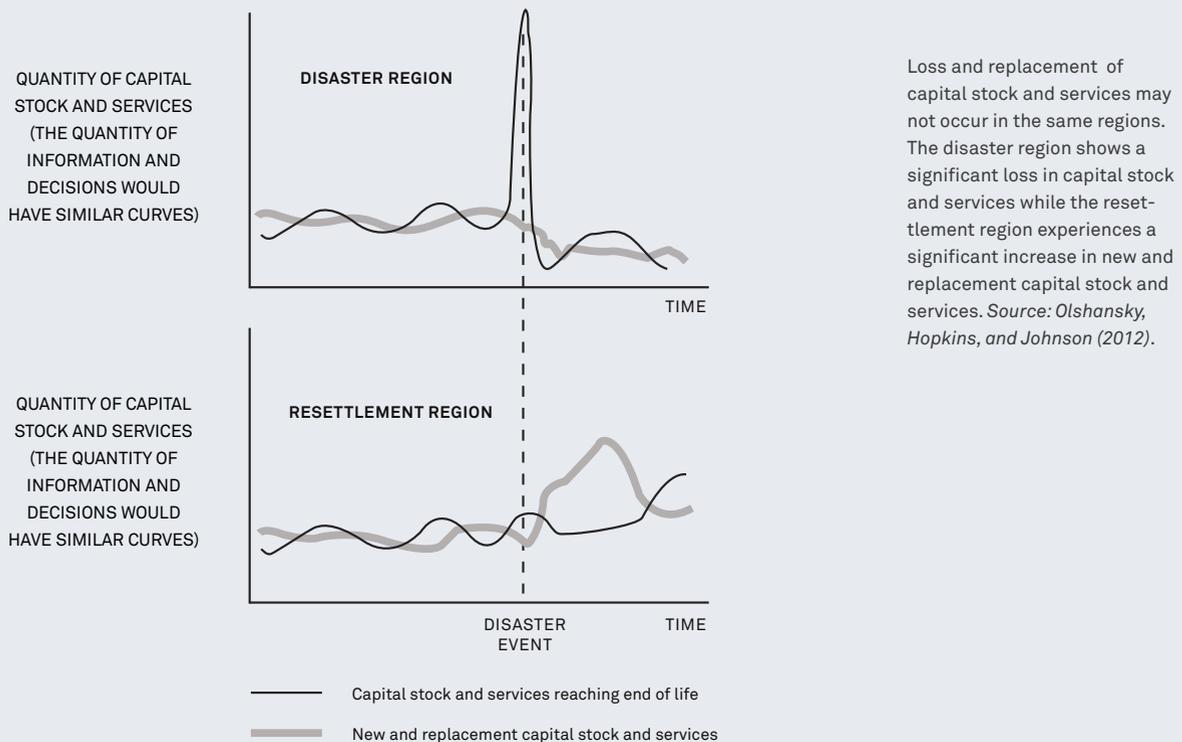


Figure 3

Differential Impacts of Disasters on Capital Stocks and Services



for homeowners, businesses, outside investors, and higher levels of government. Plans can assure investors that their money will be spent on programs and projects that will further community goals. Recovery plans should address the desired physical outcomes of a city's recovery and the processes that a city wants to put in place for management structure, policies, and procedures.

Time spent planning (deliberating) after a disaster, however, can slow down the reconstruction process. Although consensus is critical to successful planning, inclusive deliberation takes time, which is a scarce resource after disaster. As described earlier, three ways to address this tension between speed and deliberation are iteration, increasing planning capacity, and decentralization. Another way is to rely on pre-disaster plans. Plan implementation will occur more quickly if a locality has active planning institutions and processes in place before disaster strikes. Pre-disaster plans can also help to improve the speed and quality of post-disaster decisions by providing a vetted vision and rationale for strategies, policies, and programs. Furthermore, localities may find that a disaster can create opportunities to implement pre-disaster policies that were unable to be realized before the disaster (Spangle Associates 1997).

It is also important to understand the value of “slowing down in order to speed up.” Some scholars have observed that time spent on planning and consensus building after a disaster can result in reconstruction processes that are less contentious, better for more stakeholders, and faster to complete (Chandrasekhar, Zhang, and Xiao 2014). Once the stakeholders agree upon the plan, they can simultaneously take action and help to accelerate the process. After all, recovery is a “collective action” requiring multiple actors.

The Cases

The case research in this report involves a range of countries that have faced the challenges of recovering from large disasters: China, New Zealand, Japan, India, Indonesia, and the United States. The purpose of studying these cases is to distill lessons that provide advice to future leaders responsible for planning and implementing recovery.

The driving research question is: How can multiple levels of government effectively manage post-disaster recovery and reconstruction, meeting time-sensitive needs while also maximizing the opportunity for community betterment? The cases here represent various management approaches within governmental contexts. Each case of recovery management falls into one of the following categories:

- **Centralized:** The national government led and controlled the overall recovery management and policy creation (e.g., China and New Zealand).
- **Partly Decentralized:** Organizations in multiple levels of government managed recovery and policy making, but with tight coordination from the national government (e.g., Japan).
- **Decentralized:** Many different organizations in multiple levels of government managed recovery policy making, with some coordination and support from the national government (e.g., India, Indonesia, and the United States).

For each case, the issues involving money, information, collaboration, and time were studied. The analysis included the critical processes and flows negotiated by recovery organizations. The broad range of international cases featured here provides models for leaders and organizations to use in their own institutional design and recovery management. This can make recovery processes faster and more effective.

CHAPTER 2

China: Top-Down, Fast-Paced Reconstruction



Following the 2008 earthquake, Weizhou, the county seat of Wenchuan County, was reconstructed in its original location in the mountains. Source: L. Johnson (2011).

The speed and volume of the reconstruction process following the Wenchuan earthquake was unique among large-scale disasters. The strengths and weaknesses of this approach can be evaluated to provide insights into governmental coordination of large-scale recovery and high-speed reconstruction during a time of extraordinary urbanization and land-use change in China.

The 2008 Wenchuan Earthquake

On May 12, 2008, a magnitude 7.9 earthquake struck Sichuan Province, affecting more than 100,000 square miles (260,000 square km) and 30 million people (Earthquake Engineering Research Institute 2008). It caused 69,226 deaths and another 17,923 people were officially reported missing (Xinhua News Agency 2008). It temporarily halted industrial production in the region. The emergency response, unprecedented in China and led by the central government, was timely, comprehensive, and well organized. But reconstruction of such a large area presented an overwhelming task. In addition, because the earthquake occurred less than three months before the 2008 Olympics in Beijing, a failed response—with all the world’s press already writing about China—would have severely undermined the nation’s image.

The 2008 earthquake caused severe damage to numerous cities throughout a wide region of China, including most of the industrial town of Hanwang, Mianzhu City. *Source: R. Olshansky (2011).*



Organizing for Recovery

China’s 50-member state council, chaired by Premier Wen Jiabao, established the Post-Earthquake Reconstruction Planning Group less than two weeks after the earthquake. Their goal was to create a recovery plan within three months (Feng 2008). Qiu Baoxing, the vice minister of housing and urban development, emphasized that post-disaster reconstruction, in contrast to short-term disaster relief, needed to be rationally and scientifically organized. To this end, the state council established the National Committee of Experts for the Wenchuan Earthquake to provide scientific support for damage assessment and reconstruction (Ke 2008).

The National Development and Reform Commission (the national economic planning agency under the state council) led the reconstruction planning effort and worked with its counterpart agency in Sichuan Province to develop a work plan. *Regulation on Restoration and Reconstruction in Wenchuan Earthquake Hit Regions*, released on June 8, 2008, outlined the planning principles (State Council of the People’s Republic of China 2008a). On September 19, the State

Council released the final version of *The Overall Planning for Post-Wenchuan Earthquake Restoration and Reconstruction* (State Council of the People's Republic of China 2008b). The plan called for restoration and recovery, as well as infrastructure and layout improvements to urban and rural areas with the goal of completing reconstruction in three years. Based on the *Evaluation Report on Resources and Environment Carrying Capacity* by the Chinese Academy of Sciences, the plan divided reconstruction areas into three categories: suitable for reconstruction, suitable for appropriate reconstruction (for areas with environmental constraints or economic limitations), and unsuitable for reconstruction (ecological areas that accounted for 63.5 percent of the planning area) (State Council of the People's Republic of China 2008b).

Following the 2008 earthquake, a new village center was built in the rural town of Xiang'e. Source: R. Olshansky (2011).

Post-earthquake recovery provided an opportunity for the central government to accelerate several ongoing development policies throughout the nation, particularly in the western region. These included policies for supporting natural resources in the western provinces, improving rural incomes, developing poor mountain areas (home to ethnic minorities), concentrating rural residents into “new villages” that created urban environments in the countryside, and integrating the governance and economies of rural and urban portions of metropolitan areas (Abramson and Qi 2011). The recovery was also viewed as an opportunity to improve regional infrastructure, increase access to the mountainous areas, and expand urbanization of existing cities, such as Dujiangyan.

In general, economic development policies revolved around a few simple concepts: close down industries in the mountains and promote tourism in those areas while promoting development of industrial parks to





shift jobs and population toward the newly urbanized areas. Recovery policies were easy for government officials to implement because they were consistent with pre-disaster development policies. Officials were familiar with the policies and implementation tools, so they took advantage of the post-earthquake recovery to help achieve their goals more quickly.

According to the September 2008 plan by the state council, the reconstruction was expected to cost one trillion Chinese yuan (RMB; US\$147 billion),¹ which is approximately equal to the entire Gross Domestic Product (GDP) of Sichuan Province in 2007, or about 20 percent of all Chinese government revenue in 2007 (China Daily 2008). The major sources of financing were loans from financial institutions (some of them backed by the state), transfers from the central government, help from eastern provinces under the “pair assistance” program, and land-based financing and land swaps (Xiao et al. 2015).

¹ All currency conversions throughout the report are approximate. The conversion provided in cited references are used when available. Otherwise, conversions are based on approximate monetary exchange rates around the time of each disaster.

The city of Beichuan, shown in 2009, was seriously damaged and abandoned as a result of the 2008 earthquake. *Source: R. Olshansky (2009).*

Notable Recovery Features

COUNTERPART (PAIR) ASSISTANCE

A unique aspect of this recovery process was the “pair assistance” program through which the state council asked 19 eastern provinces to support recovery in 24 counterpart counties, cities, or districts in Sichuan, Gansu, and Shaanxi Provinces. Donor provinces were asked to “offer assistance with no less than 1 percent of their last ordinary budget revenues” (State Council 2008b, 80). Counterpart assistance funds were applied to housing, public services, and infrastructure, “as well as services such as planning formulation, architectural design, expert consultation, engineering construction, and supervision” (State Council 2008b, 88).

Pair assistance facilitated the speed and efficiency of reconstruction. Although it came from the central government, it decentralized recovery activities. Pair assistance distributed some of the administrative

work, technical capacity, and financial burden to the wealthier provinces. By creating many more channels for financial flow, the program reduced the potential for bureaucratic bottlenecks to impede funding streams. It increased reconstruction capacity by mobilizing planners, designers, and construction specialists from the donor provinces and directly connected them to earthquake-affected counties and towns.

COLLECTIVE RELOCATIONS

Rebuilding towns and roads within the steep, unstable mountains of Wenchuan County posed a dilemma for officials, and many town leaders considered relocating. Two towns of particular concern were the Wenchuan County seat of Weizhou and the Beichuan County seat of Beichuan. Both had grown considerably in geologically unstable areas since the 1950s. Officials

decided to rebuild Weizhou in place, but improved its infrastructure, access, and flood design. In contrast, in an October 2008 survey, displaced residents of Beichuan—where 80 percent of the buildings had collapsed, approximately 6,000 people lost their lives, and landslides and flooding caused further damage—asked to move to a new site.

The new Beichuan town site occupied a broad valley about 14 miles (23 km) from the original site on land that formerly belonged to neighboring Anxian County. In addition to the benefit of safety, the new location offered a way to integrate the economy of mountainous Beichuan County with the valley economies of Mianyang and the rest of Sichuan Province. The state council approved the site in November 2008, the land was transferred three months later, and the first group of residents, selected by lottery, moved into the new town in December 2010. It was projected to have a population of 35,000 in the near term and 70,000 in the future, though much of the town remains unoccupied (Sorace and Hurst 2015).

The new city of Beichuan, completed in 2010 and shown in 2011, was built to house 70,000 people. *Source: L. Johnson (2011).*



RECONSTRUCTION OUTCOMES

Most of the reconstruction of housing, infrastructure, and public buildings was complete within three years. By May 2010, all housing reconstruction was finished, including almost 2 million units of new rural housing, 290,000 units of new urban housing, and untold millions of repaired units (Yong and Booth 2011).

Lessons

The speed of reconstruction and the organization required to accomplish it was remarkable by any measure. This was possible because the central government made reconstruction its overwhelming priority. Officials at every level of government knew that their superiors would hold them accountable for quickly and diligently following the reconstruction plans. It was also possible because much of the rapidly growing Chinese economy was based on national urbanization on a massive scale. In 2008, China already had a high capacity and experience in building cities quickly.

The central government saw recovery as an opportunity to modernize the Sichuan region, improve infrastructure, and promote economic development while preserving the environment and the positive aspects of traditional cultures. Pre-existing programs for urbanization, urban-rural consolidation, and transformation of economies in the mountainous ethnic areas were expanded and accelerated. According to a study by Peng et al. (2013), the urban-rural integration process of several villages in Dujiangyan was mostly successful, although resident participation varied greatly among villages. Economic development policies, applied uniformly across the region, were less successful. They did not appear to be based on

market analyses of tourism potential or the demand for industrial space. The industrial park in the new city of Beichuan, for example, is still mostly vacant.

Recovery plans emphasized the importance of public involvement in reconstruction decisions, but given the speed of plan preparation, this was difficult. Although many of the planning efforts involved numerous public meetings, most public consultations were rushed and merely presented plans rather than involving the residents in creating the plans. This was not true in all cases: Dujiangyan, for example, effectively involved many residents in housing reconstruction (Chandrasekhar, Zhang, and Xiao 2014).

Simply quantifying the number of new housing units, however, ignores the importance of livelihoods, social networks, and household and community needs.

Chinese officials consider the recovery from the Wenchuan earthquake a success because of the rapid reconstruction, evidenced by the number of housing units constructed in a short period. Simply quantifying the number of new housing units, however, ignores the importance of livelihoods, social networks, and household and community needs. Research indicates that many of the new developments did not provide jobs for residents or places for people close to appropriate jobs. Other community needs were not met. The pair assistance system distributed recovery activities to a variety of actors on a national scale but not at local scales, where communities and individuals had limited involvement in the recovery choices. By emphasizing speed, planners missed the opportunity to involve stakeholders and develop innovative, alternative approaches (Abramson and Qi, 2011).

CHAPTER 3

New Zealand: Centralizing Governance and Transforming Cityscapes



The highly successful temporary Re:Start Mall in Christchurch was built out of shipping containers amid the downtown reconstruction. *Source: L. Johnson (2015).*

Although New Zealand was well prepared for a large earthquake, the recovery process from the 2010–2011 Canterbury earthquake sequence has been challenging. Since the 1990s, New Zealand’s national government developed a sophisticated emergency management system that included a framework for recovery management. In addition, following a 1931 earthquake, New Zealand adopted seismic provisions as part of its building codes. It became one of the first countries in the world to offer government-backed earthquake damage insurance. Today, the New Zealand Earthquake Commission (EQC) insures the country’s residential properties against earthquakes, volcanic eruptions, hydrothermal activity, tsunamis, natural disaster fires, and natural landslides.

The 2010 and 2011 Canterbury Earthquakes

On September 4, 2010, a magnitude 7.1 earthquake located about 27 miles (44 km) west of Christchurch, shook the Canterbury region of New Zealand's South Island. Given the generally strong building practices for residential construction, there were few injuries and no fatalities. Yet the earthquake caused considerable damage to older commercial buildings. Some neighborhoods also experienced dramatic ground failures, largely caused by liquefaction of the highly saturated soils in eastern Canterbury.

Thousands of aftershocks followed. On February 22, 2011, a magnitude 6.3 earthquake struck just 4 miles (6 km) from the Christchurch Central Business District (CBD). This earthquake caused far greater damage than the September earthquake. One hundred eighty-five people died, most in two dramatic building collapses in the CBD. A 1.5-square-mile (4-square-km) area of the CBD was initially cordoned off and some portions remaining closed for more than two years. Most of the 2,000 commercial buildings in

The central business district of Christchurch was cordoned off for more than a year to help ensure public safety from aftershocks and to facilitate the demolition of damaged buildings. *Source: L. Johnson (2012).*

Christchurch's CBD were damaged, displacing more than 4,000 businesses and 55,000 central city workers (CERA 2014; Chang et al. 2014). Over 100,000 of the region's 160,000 homes suffered significant damage (NZ HRC 2013). The continuing aftershocks caused additional liquefaction and more destruction to buildings.

The national government's total cost for responding and rebuilding following the 2010–2011 earthquake sequence is now estimated at NZ\$16.5 billion (US\$13.2 billion),² out of a total public and private reconstruction cost of NZ\$40 billion (US\$32 billion)—close to 20 percent of New Zealand's annual gross domestic product (English 2014; Law 2015).

Organizing for Recovery

On September 6, 2010, Prime Minister John Key announced the appointment of the Honorable Gerry Brownlee—minister for economic development and a National Party member of parliament from Christchurch—to a new cabinet position as minister for Canterbury earthquake recovery. Brownlee would head a newly appointed ad hoc Cabinet Committee on Canterbury Earthquake Recovery that would meet regularly to ensure ministerial coordination with the purpose of speeding up recovery planning and approval processes to meet pressing needs.

² The currency conversion is 1 New Zealand Dollar (NZ\$) = 0.8 United States Dollars (US\$).



The Canterbury Earthquake Response and Recovery Bill, introduced and unanimously passed in one day (September 14), provided statutory power to support earthquake response. It also effectively allowed national government ministers to override almost any New Zealand law and thus transferred considerable lawmaking power from the legislative to the executive branch of the national government. The act also established the Canterbury Earthquake Recovery Commission (CERC), composed of the mayors of the three affected local governments and four appointees selected by the national government. Its main purpose was to facilitate coordination between communities and the national government (National Library of New Zealand 2011).

On April 14, 2011, following the February earthquake, Parliament enacted the Canterbury Earthquake Recovery (CER) Act 2011 with a nearly unanimous vote. Despite the easy approval, opponents expressed concerns that it granted a wide range of unilateral powers to both the minister for CER and its newly created special-purpose national department—the Canterbury Earthquake Recovery Authority (CERA) (New Zealand Parliament 2011). It allowed the minister for CER to acquire land compulsorily, suspend any parts of a variety of local government planning acts, and direct any local authority to take certain actions. The CER Act also required the development of two plans within nine months: a long-term recovery strategy for greater Christchurch to be prepared by CERA, and a draft recovery plan for the Christchurch CBD to be prepared by the Christchurch City Council.

CANTERBURY EARTHQUAKE RECOVERY AUTHORITY (CERA)

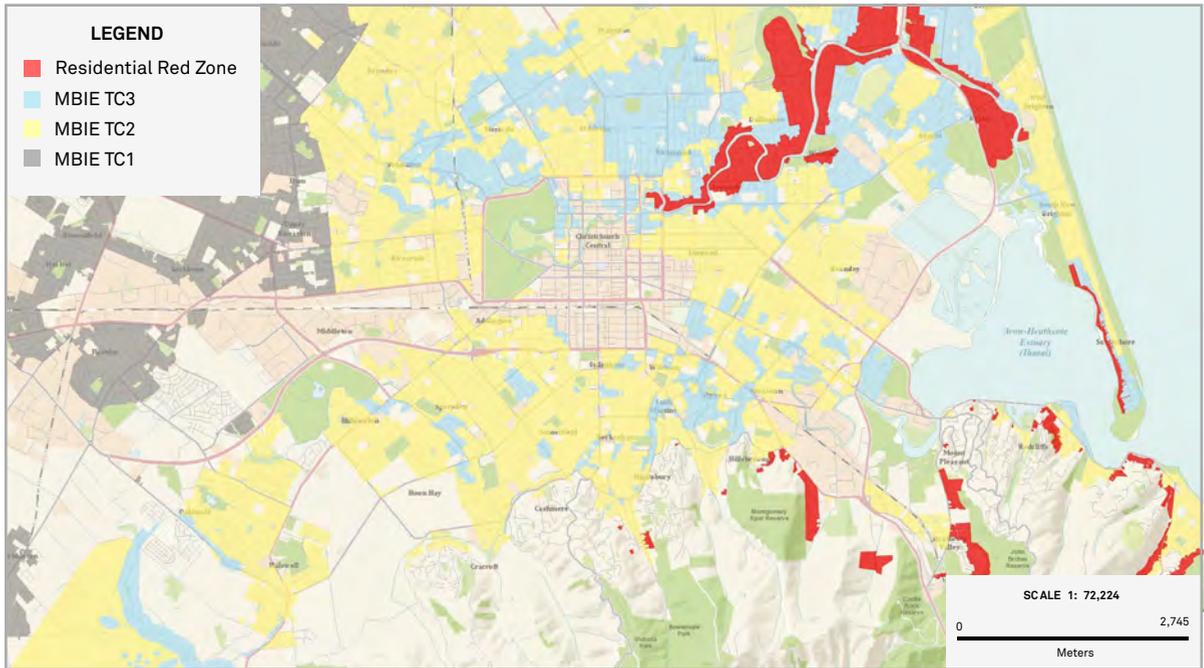
CERA and its chief executive reported directly to the minister for CER. Over time, CERA became involved in a wide range of activities, including setting recovery policy and leading operations. As of May 2014, CERA had 331 fixed-term employees and another 102 contractors or personnel temporarily acquired

from other agencies (Murdoch 2014). Many staff members came from regional and local authorities, such as Environment Canterbury and the Christchurch City Council.

CERA developed the draft *Recovery Strategy for Greater Christchurch (Mahere Haumanutanga o Waitaha)*—the overarching framework of 23 programs to guide the Canterbury recovery efforts (CERA 2012). According to the CER Act of 2011, all recovery plans must be consistent with the recovery strategy. In partnership with other agencies, CERA also developed a recovery monitoring and reporting framework, including a monthly economic recovery dashboard, quarterly reports of economic indicators for the Canterbury region, an annual Canterbury wellbeing index to track social recovery, and a semiannual wellbeing survey of approximately 2,500 randomly selected residents. CERA also managed the two-and-a-half-year cordoning and demolition process in the central city, the planning and reconstruction, the voluntary residential acquisition and clearance process, and the expedited planning for new residential developments to offset housing losses. With the 2011 authorizing legislation set to expire in 2016, CERA began transitioning into an agency within the Department of the Prime Minister and Cabinet in early 2015, and the national government began to draft the next-generation organization and authorizing legislation.

EARTHQUAKE COMMISSION (EQC)

The EQC has been much more than an insurer. Following the earthquake on September 4, 2010, the national government asked the EQC to take direct responsibility for the repairs or rebuilding of insured homes rather than simply paying cash settlements to homeowners (Brownlee 2010a). The EQC also conducted land-damage assessments as part of its claims process using remote sensing and subsurface investigations to characterize the regional issues while hundreds of engineers conducted detailed land-damage assessments. The EQC's geotechnical analyses of



This map shows the red zone areas and the three green zone technical categories (shown in blue, yellow, and gray) for residential foundation repairs in central Christchurch as of February 2016. *Source: New Zealand Government (2016).*

land damage mapped 22,500 properties in Canterbury and separated them into three recovery zones with the 3,300 most severely damaged properties—in zone C—slated to require a “wide-scale coordinated and strategic approach to repair the land.” Homes in this zone would likely be demolished and rebuilt. (Brownlee 2010b).

The earthquake on February 22, 2011, tripled the number of severely affected properties. Following two large aftershocks in June, Prime Minister Key and Minister Brownlee announced the cabinet’s decision to reclassify the region’s earthquake-damaged residential properties into four new zones according to their suitability for reconstruction (Key and Brownlee 2011). In effect, this decision relieved the EQC from repairing land damage on properties located in the “red zone” that were deemed unsuitable for reconstruction.

The EQC received more than 504,500 claims for buildings, contents, and land damage for more than 13 separate events (EQC 2015). As of June 2015, the EQC had completed over 65,000 home repairs and settled, through cash payments or repairs, nearly all of its building- and contents-related claims (EQC 2015). It is estimated that it will take 30 years to replenish the nearly NZ\$6 billion (US\$4.8 billion) the Natural Disaster Fund had prior to the Canterbury earthquakes (Small and Meier 2015).

STRONGER CHRISTCHURCH INFRASTRUCTURE REBUILD TEAM (SCIRT)

To rebuild infrastructure, the city and national government formed an alliance consisting of three organizations that financed the damaged infrastructure (CERA, Christchurch City Council, and New Zealand Transport Agency) and five companies responsible for the design, infrastructure repair, and reconstruction work. The formal alliance began in September 2011, with an anticipated five-year program. The rationale for the alliance was that the scope of work was difficult to define in a simple contract and the flexibility to evolve over time was necessary. The risk was

shared among the owners and the companies responsible for the repairs and reconstruction. SCIRT is scheduled to sunset in December 2016, when responsibility for any remaining work will transfer to the infrastructure owners.

Notable Recovery Features

RESIDENTIAL LAND ZONING AND “RED ZONE” BUYOUTS

EQC-funded geotechnical studies following the September 4, 2010, earthquake recommended a wide-scale approach to land repair that would likely involve the demolition and subsequent reconstruction of homes heavily affected by liquefaction and other ground failures (Brownlee 2010c). But the more widespread land damage caused by the quake on February 22, 2011 and its subsequent aftershocks changed this. As mentioned, in June 2011, the national government classified the region’s earthquake-damaged residential properties into four zones (Key and Brownlee 2011):

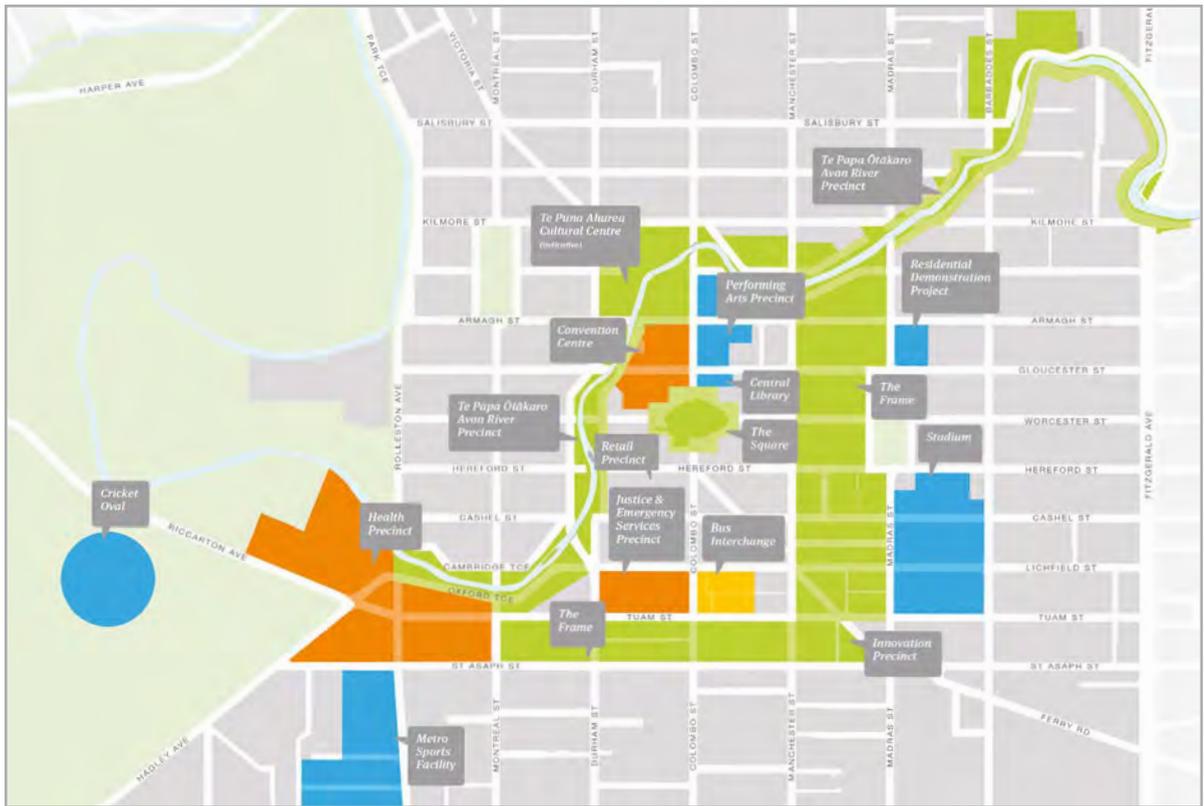


A view across one of the red zone areas is shown in September 2015, where most homes have now been demolished and planning for reuse is scheduled for 2016. *Source: L. Johnson (2015).*

- **Red zones** were unsuitable for reconstruction and would be subject to a national government-backed voluntary buyout program (5,176 properties).
- **Green zones** were suitable for rebuilding in accordance with one of three technical categories (TC) of foundation repair and reconstruction requirements (about 100,000 properties).
- **Orange and white zones** required further investigations (about 13,540 properties). Eventually these would be reclassified as either “red” or “green.”

Despite the comprehensive vision presented in the June 2011 announcement, the actual policy development and implementation of the residential land zoning and buyout process took several years to complete and it evolved over time. Most major decisions did not involve public consultation to formulate the policy, but instead followed a communication process of public statements, decisions by Minister Brownlee, and outreach efforts to the community by CERA staff.

By July 2013 (two years after the program’s launch), CERA obtained voluntary sale and purchase agreements from 95 percent (7,143) of red zone residential property owners in which they accepted one of two options: to sell both their land and structures or to sell only their land and maintain their insurance claims to buildings and contents (NZ HRC 2013). The national government offered only half of the pre-earthquake value of the land for uninsured residential and nonresidential properties in the red zones. This decision was challenged in the courts, which ultimately directed CERA to go through a formal public planning process to determine the purchase policies for these properties. All properties acquired through the red zone program were owned by the national government, which worked with local governments to develop future plans for the reuse of the land.



CENTRAL CHRISTCHURCH PLANNING AND IMPLEMENTATION

In May 2011, the Christchurch City Council launched the CER Act recovery planning process for the CBD. The public engagement campaign, known as “Share an Idea,” attracted more than 106,000 suggestions from the public and included a web-based noticeboard for posting ideas. Ten thousand people attended a two-day expo. Five overarching themes emerged as necessary elements to ensure that the central city became economically vibrant again: a greener city, a stronger identity, a more compact CBD, improved housing and cultural resources, and greater accessibility to and around the CBD (Christchurch City Council 2011). Under the CER Act, final approval of the plan was entirely up to Minister Brownlee. In April 2012, he announced that he supported the general concepts of the plan but that he would establish a Christchurch Central Development Unit (CCDU) within CERA and charge them with preparing a final Christchurch Central Recovery Plan including a blueprint plan within 100 days. The blue-

The location of proposed precincts and anchor projects are laid out in the Christchurch Central Recovery Plan of July, 2012. Source: Canterbury Earthquake Recovery Authority (2012).

print was unveiled to the public on July 30, 2012, and became law on July 31, 2012. It placed 17 anchor projects and use-oriented precincts within the central city and reduced the CBD footprint to only 100 acres (40 hectares) to be “framed” to the south and east by open space and low-density development (CCDU 2012).

The CCDU has led the implementation of the plan, which involves funding, land acquisition, demolitions and site clearance, decisions on all development proposals, and reconstruction management. The national government’s approach has been to fund “anchor projects” to catalyze private investments. However, some anchor projects have been delayed, and some people fear that investor confidence is waning. Others believe that new buildings under

construction will bring up to 8,000 office workers over the next two years (McDonald 2015). Displaced CBD businesses will need to decide whether to return to the area.

Lessons

The aim of the national decisions in response to the Canterbury earthquakes was to speed up and improve decision making and to reduce uncertainty for residents, businesses, insurers, and other stakeholders. But, as is the case with many disasters, some homeowners, landowners, and businesses benefited and some did not.

Recovery authority and land-use policy making has been centralized at the national level away from local governments. Early analysis suggests that the centralization may have strengthened coordination among national agencies, expedited the policy and decision-making processes, and ensured accountability for the sizable national government expenditure. However, centralization may not have been as effective at facilitating coordination among national, regional, and local levels of government; building capacity at the local and regional levels for sustained support of decisions and implementation; and promoting collaboration and empowerment between government and the private sector (Johnson and Mamula-Seadon 2014). Some claim that the lack of public involvement has poorly served populations that were already disadvantaged (NZ HRC 2013).

Through the EQC, the national government has had responsibility for financing much of the residential reconstruction and continuing to insure the nation's residential properties against future events. Much of the centralization of New Zealand's recovery was driven by the national government's concern about its current and future insurance obligations. The EQC's unique obligation to repair residential land damage stimu-

lated the regional geotechnical studies that provided scientific information to shape the residential land zoning and land-buyout policies. The red zone voluntary buyout program provided options for residents to sell and relocate, and it reduced the financial risks to the government and insurers. Removing the most vulnerable properties from residential occupancy also reduced future risks to insurers, local councils, and private utilities.

While the risk of future hazards was significantly reduced for New Zealand's government and residents, some new uncertainties resulted from these policy actions. The widespread damage created immediate shortages of both rental and for-sale housing at a time of increased demand by displaced residents and recovery workers. On average, housing costs rose more than 30 percent across the region (QV.co.nz 2015). Coupled with lengthy insurance settlements and complex engineering requirements for the repair and reconstruction of building foundations, this increase meant that many residents did not experience the certainty that the national government's land-zoning decision was intended to provide. A high proportion of the lost housing units were affordable rental housing or social housing, and these households have found it particularly difficult to find affordable replacement housing (NZ HRC 2013).

Two major legal challenges to the national government's land-use policies were mounted by property owners in the red zone as well as by landowners who questioned the national government's efforts to make more land available for housing and rebuilding. The courts determined that the CER Act called for recovery planning processes that involved community participation. If a participatory planning process had been held earlier in the policy formulation stage of land zoning decisions, many of the consequential issues that required supplemental policies, programs, and actions would likely have been brought to light.

CHAPTER 4

Japan: National Land-Use Regulations Drive Recovery



Throughout its history, Japan has struggled and prevailed against a host of natural and manmade calamities. The country's strongly centralized governance structure has had an impact on post-disaster recovery. In the absence of an established recovery policy framework, each major disaster has required new institutional arrangements to manage multilevel governmental collaborations, although the national government has always maintained strong control over public policy, standards, and finances.

Kobe's central business district rises up from the harbor along Osaka Bay. The damaged port of Kobe is fully restored, but never regained the volume of cargo shipping it had prior to the 1995 earthquake. *Source: L. Johnson (2013).*

Japan's City Planning Law requires that local governments adopt and update long-range master plans that are subject to the approval of the prefecture and national government (Sorensen 2002). Two major planning tools—redevelopment and land readjustment—are used in modern urban development. The national government subsidizes the cost of redevelopment, but most of it is financed through the sale of additional floor space beyond replacing what was there before. Land readjustment, which resubdivides existing parcels, is a complex process involving modification of property boundaries to widen roads and to provide new open spaces and other public facilities. Under land readjustment, each landowner loses some land area, but the new infrastructure and improved accessibility add value to each parcel.

Following the Great Kanto earthquake and fire of 1923, Japan's national government took a major leadership role in planning, financing, and implementing a disaster rebuilding process for Tokyo and Yokohama. Land readjustment was the main approach for reconstruction.



Fires blaze in Kobe on the morning of the January 17, 1995 earthquake. Source: Ikuo Kobayashi (1995). Reprinted with permission.

In recent years, the roles of citizens and local governments in the planning process have been increasing. Sorensen (2002) dates the beginning of *machizukuri*, or community-based planning, to the passage of the 1968 City Planning Law.

The 1995 Kobe Earthquake

When the magnitude 6.9 Great Hanshin Awaji earthquake struck on January 17, 1995, the strongest ground motions hit the City of Kobe and the heavily urbanized corridor of southern Hyogo Prefecture along Osaka Bay. Fires consumed 203 acres (82 hectares) of urban land, more than 400,000 buildings were damaged, and thousands of households needed to relocate (Hyogo Prefecture 1999). Major east-west transportation systems were damaged or collapsed. The earthquake caused severe damage to neighborhood businesses, manufacturers, and the Port of Kobe. Eighty percent of the city's 2,000 small- and medium-sized businesses failed (City of Kobe 2012).

Organizing for Recovery

The 1995 earthquake was the first nationally significant natural disaster since the Great Kanto earthquake and fire in 1923 that destroyed central Tokyo and Yokohama and displaced more than half a million families (Tokyo Metropolitan Office 1933).

NATIONAL GOVERNMENT

In order to expedite recovery, on January 20, 1995, the national government established a restoration headquarters within the prime minister's office, rather than legislatively establishing a new agency (Mitsui 2014). Prime Minister Murayama Tomiichi was the executive head of the new office, which included various cabinet ministers with roles in recovery funding (Edgington 2010). In this model, the national government's funding and execution of policies remained in the hands of

various ministries instead of the headquarters. Implementation, however, resided largely with the local and prefectural governments. The headquarters was supported by a national advisory council called the Committee for Hanshin-Awaji Reconstruction, which included prominent city-planning scholars, business leaders, the governor of Hyogo Prefecture, and the mayor of Kobe, who provided recommendations to guide reconstruction and economic recovery. In all, the national government funded more than ¥5.8 trillion (US\$58 billion)³ to reconstruct basic infrastructure, housing, and other physical facilities (Ito 2004).

HYOGO PREFECTURE

Hyogo Prefecture and the City of Kobe conducted parallel planning efforts in consultation with the national ministries that provided recovery funding. The prefecture established a restoration headquarters on January 30, and the planning section began drafting basic concepts for the prefectural reconstruction plan aligned with the planning priorities provided by the national Reconstruction Committee. Hyogo Prefecture's Governor Kaihara was included in this group.

In April, the basic concepts for the Hanshin-Awaji Earthquake Reconstruction Plan identified the areas that suffered the heaviest damage as priority restoration districts for large-scale government investments (Saito 1999). Six months after the earthquake, in response to heavy public criticism about the lack of public participation in initial planning decisions, Hyogo Prefecture began to encourage cities to establish the *machizukuri* citizen-participation process.

On July 31, 1995, the prefecture issued the first version of the Hanshin-Awaji Earthquake Reconstruction Plan, named the Hyogo Phoenix Plan. This 10-year plan contained 1,680 projects, cost ¥12 trillion (US\$120 billion), and represented an integration of all the city planning

efforts in the prefecture (Edgington 2010). It included 18 land-readjustment project areas and 12 urban-redevelopment areas. It also called for the provision of 125,000 new housing units within three years.

CITY OF KOBE

On the first day of the earthquake, city staff and Major Sasayama, who had served for many years as a city planner after World War II, began formulating a recovery plan. Nine days after the earthquake, Mayor Sasayama formally announced the establishment of Kobe's earthquake recovery headquarters, which he would head. He also outlined his vision for recovery. In order to submit a funding request to the national government for the new fiscal year beginning on April 1, Kobe devised a two-phase planning process. The city used the first phase to determine the location and general composition of major restoration projects, including arterial streets and major parks that the central government was willing to fund quickly. The second phase was for working out project details with the citizens. Although this approach was primarily for land-readjustment, the city also applied it in other restoration areas.

The city established a 27-member recovery planning committee composed of officials and scholars from a range of disciplines to develop recovery planning guidelines, which were released on March 27 (City of Kobe 2010). The disaster restoration areas were popularly classified as “black zones” for major project areas with high public agency involvement, “grey zones” in which various types of voluntary assistance programs would be promoted, and “white zones” where there would be less government intervention. Public participation was limited during the first phase of planning because of time constraints. In the second phase, the mayor enhanced public consultation and the city supported the creation of neighborhood-scale planning committees (*machizukuri kyogikai* or “*machi-kyo*”). By late 1995, more than 100 *machizukuri* organizations were established in the City of Kobe (Evans 2001).

³ An average 1995 currency conversion rate of 1 U.S. Dollar (US\$)=100 Yen (¥) is used for Kobe financial data.

In the second phase of planning, the city formed an earthquake restoration planning council of 100 selected individuals—a mix of stakeholders and academic experts—to transform the recovery planning guidelines into a draft recovery plan. Kobe's Restoration Plan was published on June 30, with a budget of ¥9 trillion (US\$90 billion) (City of Kobe 1995). The plan contained 1,000 projects; 17 were identified as high priority. The Kobe Reconstruction Emergency Three-Year Plan for Housing was published a week later and called for 82,000 housing units and the creation of a rent-reduction system. As policy statements, these two plans provided the basis for national government funding.

The City of Kobe established six land-readjustment project areas designed to provide wider roads and parks, as well as two earthquake restoration urban redevelopment projects. These two new massive developments, reflecting the City of Kobe's pre-earthquake master plan, created major urban subcenters along the Japan Rail line.

Notable Recovery Features

On January 17, 2015, residents of Kobe and Hyogo Prefecture gathered at 5:46 a.m., just as they have each year on that day to remember those who passed away 20 years ago. In the City of Kobe, this gathering occurs at the park next to City Hall, which today is surrounded by many up-scale residential and commercial developments built since 1995. To most visitors, Kobe is a vibrant, cosmopolitan city, completely recovered from the disastrous 1995 earthquake. The infrastructure and downtown were rebuilt within a few years of the disaster. The earthquake created many community-level opportunities for improvements: new parks, widened roads, and disaster preparedness features.

Today's population in Kobe is now greater than it was before the earthquake and most neighborhoods



Roads like this one in the Shin-Nagata land-readjustment area were widened throughout Kobe as part of the post-earthquake rebuilding effort. *Source: L. Johnson (2013).*

have been rebuilt. However, a few pockets of vacant or underutilized land remain, particularly in the less affluent parts of western Kobe. These wards have seen a decline in population, as low-cost housing in these areas was not rebuilt. Reconstruction in the land-readjustment areas proceeded more slowly than in other areas; it took time to resolve property rights and to perform extensive land surveys. The two redevelopment projects at Shin-Nagata and Rokkomichi also took many years to complete. Even so, both of these efforts proceeded much faster than typical redevelopment projects in Japan.

The reconstructed housing and commercial buildings are seismically stronger than before, but residents of new multistory projects have had to adapt to new living environments that were quite different from the traditional one- and two-story housing to which they were accustomed. This transition was especially hard for senior citizens. In addition, the pressure to quickly construct housing, especially public housing, meant that many housing projects were built in expedient locations, rather than in locations that provided the access residents needed.

Debt was one repercussion of the successful reconstruction. The City of Kobe, Hyogo Prefecture, and many smaller cities endured substantial financial hardship for many years due to earthquake-related debt and reductions in national government subsidies. According to Kobe Vice-Mayor Tsuruki, the city had approximately ¥290 billion (US\$2.9 billion) in debt and had to respond by cutting staff, lowering salaries, and reducing social-welfare programs. The city also tried to raise new revenues from land and asset sales. It has taken decades for the city to pay down its debt. Debt also extended to individual disaster victims and business owners who had difficulty repaying various types of disaster recovery loans (City of Kobe 2012).

The 2011 Tohoku Earthquake and Tsunami

On March 11, 2011, a magnitude 9.0 offshore earthquake generated tsunami waves with record heights that inundated over 216 square miles (560 square km) of coastal land in northeast Honshu (Central Disaster Management Council 2011). In all, 15,880 people

perished and 2,694 are still reported missing. Nearly 400,000 buildings were either completely or severely damaged. Direct financial damage to buildings, utilities, and social infrastructure was approximately ¥16.9 trillion (US\$169 billion) (Reconstruction Agency 2015).

Evacuees from Fukushima Prefecture faced a particularly complex and long-term evacuation because of the nuclear disaster and contamination to surrounding land. Initially, residents within a 12.5-mile (20-km) zone were forced to evacuate, but later the evacuation zone grew. After several revisions, contaminated areas were separated into three zones based on the levels of radiation and the potential for reoccupancy (Reconstruction Agency 2013b). The future is still uncertain.

Ten percent of Otsuchi's 16,000 residents, including the town's mayor and nearly 50 town employees, perished in the tsunami in March. This photo was taken in September.
Source: R. Olshanky (2011).





Organizing for Recovery

NATIONAL RECONSTRUCTION DESIGN COUNCIL

One month after the March 11 disaster, Japan's Prime Minister Naoto Kan established the National Reconstruction Design Council, charged with developing concepts and strategies for recovery and rebuilding. Its fifteen members came from academic, business, and religious groups, along with the governors of Iwate, Miyagi, and Fukushima Prefectures. In addition, a nineteen-member study group was established to provide technical support to the council. On June 25, 2011, the council released its 39-page national recovery vision entitled *Towards Reconstruction: Hope Beyond the Disaster* (Reconstruction Design Council 2011).

The council called for a two-level approach to future tsunami risk management. Based on historic tsunamis in the Tohoku region, a Level 1 (L1) tsunami was defined as an event with greater than 1 percent annual probability of occurrence, and a Level 2 (L2) tsunami had less than 1 percent annual probability of occurrence. The 2011 tsunami was classified as a L2

In September 2011, families visited a school near Onagawa where children perished in the tsunami. The land elevation of much of the Tohoku coastline subsided as the earthquake shifted the earth's crust, increasing coastal flooding. Source: L. Johnson (2011).

tsunami. The policy consensus was that large-scale structural measures, such as levees, would protect land and people against L1 tsunamis. Additional land-use and nonstructural measures, such as evacuation plans, would supplement levee defenses to secure human lives against L2 tsunamis (Japan Society of Civil Engineers 2011). Based on these principles, the report presented five schematics of future land-use patterns to reduce the risk of tsunamis. They involved relocating land uses and both raising the base elevation of land and the heights of levees. The council's vision represented a fundamental shift in disaster-related policy making in Japan, which traditionally focused on "disaster prevention"—seeking to avoid disaster damage altogether. The Ministry of Land, Infrastructure, and Transportation (MLIT) hired consultants to help local governments develop land-use plans that incorporated the L1 and L2 tsunami-protection concepts.

NATIONAL RECONSTRUCTION AGENCY

On February 10, 2012, eleven months after the March 2011 disaster, the national government combined the 1995 and 1923 governance approaches to establish the new Reconstruction Agency. The group reported to the prime minister and managed the national recovery funds that flowed either through national ministries or directly to local governments.

The agency coordinates the national ministries that oversee reconstruction programs. It also directly administers various recovery activities to reduce administrative tasks for local governments. It has a staff of more than 400 people from different national government ministries. There is a national headquarters, as well as three offices in Iwate, Miyagi, and Fukushima Prefectures, and eight branch offices in the heavily impacted communities along the coast. The agency is authorized to run until at least October 2020, but it can be extended if necessary. The authorizing legislation also established the Reconstruction Promotion Council, an oversight committee composed of experts and government leaders who monitor the quality of reconstruction.

Four national-level programs address the physical rebuilding of local areas. The Collective Relocation Program, initially established in 1972 to promote the relocation of disaster-prone communities prior to disasters, relocates communities away from tsunami hazard zones. The Land Readjustment Program is used to rebuild more safely in place, primarily by raising the base elevation of land. The Public Housing Program stems from the Act on Public Housing of 1951 and subsidizes public rental housing for disaster survivors without the financial capacity or ability to rebuild their own houses. Finally, a special Tsunami Recovery Zone Program was created through national legislation passed in October 2011 to establish special zones in which rebuilding was more flexible than in other funding programs. This program funds redevelopment of basic urban services and facilities in devastated

localities. It can be used for industrial, residential, and mixed-use redevelopment, as well as development of agricultural land.

Throughout 2011, Japan's national government approved three supplementary budgets totaling ¥15.16 trillion (US\$151.6 billion). The third supplementary budget of ¥9.24 trillion (US\$92.4 billion) focused on funding longer-term rebuilding (Reconstruction Agency 2013a). To access the funds, prefectural and local governments were required to complete a recovery plan, deliver the plan to the reconstruction agency for review, and submit applications that aligned with the national reconstruction guidelines released in June 2011.

PREFECTURES

Shortly after the March disaster, each of the three most heavily impacted prefectures established its own reconstruction bureau and recovery advisory committee. Similar to the National Reconstruction Design Council, each of these committees was composed of academics and leaders from government, industry, and community.

Iwate and Miyagi Prefectures quickly initiated plans to gather input from cities and residents on reconstruction principles, policies, and project proposals for national government funding. Plan proposals included relocating housing in various combinations, elevating land uses and infrastructure, providing protective walls, engaging in cooperative economic development efforts, and investing in new technology and energy efficiency. Iwate and Miyagi Prefectures completed their recovery plans by August and October 2011, respectively, and both set a ten-year time frame for rebuilding with the caveat that a significant commitment of national funds would be needed to fulfill these visions. Fukushima Prefecture did not complete its draft plan until the end of December 2011 because of complications resulting from the nuclear disaster.

LOCAL GOVERNMENT

Before local governments could plan, they needed to replace staff and officials who perished in the disaster. Prefectures dispatched staff to impacted cities; national ministries sent help to both the prefectures and cities. For the first time, Japan's Ministry of Land, Industry, Transport and Tourism provided funds for cities and prefectures to hire consultants to assist with recovery planning (Iuchi, Johnson, and Olshansky 2013).

Most local planning processes established local advisory committees, integrated national and prefectural reconstruction concepts into local plans, and involved citizens in the planning process. However, the pace of planning varied considerably. Some cities initiated efforts soon after the March 2011 disaster and announced plans within the first two months. By the first anniversary, 59 local governments had prepared reconstruction plans that outlined basic principles and strategies for rebuilding (Japan Cabinet Office 2012). That number continued to rise to a total of 81 by the third anniversary. Most local governments set seven- to ten-year targets for rebuilding.

The levels and methods of citizen involvement in planning varied by locality (Iuchi, Maly, and Johnson 2015). Some localities shared information and collected citizen input through surveys, workshops, and newly created *machizukuri* committees. Other cities, particularly larger ones, had more limited outreach, mostly via early-stage questionnaires and public hearings conducted midway through preparing the draft plan. As the draft neared completion, public presentations focused on sharing information rather than soliciting feedback. While the plans varied in their specificity, almost all featured policies for land-use planning, promoting industrial and economic revitalization, managing and reducing disaster risk, and protecting lives and the environment (Iuchi, Johnson, and Olshansky 2013).

Notable Recovery Features

Criticism over the slow pace of recovery was mounting, particularly in areas that were being reconstructed. In February 2013, weeks before the second anniversary of the disaster, Prime Minister Abe announced major reforms to both the National Reconstruction Agency and the recovery programs with the goal of accelerating disaster reconstruction (Nemoto 2014). In order to provide more local oversight and to help accelerate decontamination and recovery efforts, the reconstruction agency established a second headquarters in Fukushima Prefecture to work with a new Tokyo headquarters for Fukushima reconstruction and revitalization.

The Reconstruction Agency has worked to increase the flexibility of national recovery programs by relaxing the criteria for prefectural and local recovery projects. As of August 2013, ¥581 billion (US\$5.81 billion) in national funding was allocated to 92 local governments in 11 prefectures (Reconstruction Agency 2013b). However, even with the reforms and broader program definitions, it continues to be difficult to transfer funds to local governments for implementation (Iuchi, Maly, and Johnson 2015). Obstacles include the lack of local governmental capacity, shortages in labor, scarcity and surging prices of materials, difficulties in securing storage sites for contaminated soil materials, and trouble coordinating the reconstruction plans with residents. Decisions about where and how to rebuild have been sources of continuing debate between local governments and residents (Ubaura 2015). While some localities want higher levees to increase safety, others want lower heights, reflecting community concerns for aesthetics and future coastal access (Iuchi, Maly, and Johnson 2015).

By the fifth anniversary of the disaster, most debris had been cleared in Miyagi and Iwate Prefectures. Work is underway to elevate land, relocate communities to higher ground, and construct public housing.



In January 2014, massive land-raising operations were underway in the City of Rikuzentakata, Japan, as well as many other coastal communities impacted by the 2011 earthquake and tsunami. Earth was excavated to prepare new housing sites in the hillsides and was conveyed downhill to elevate land along the harbor. *Source: K. Iuchi (2014). Reprinted with permission.*

The recovery in Fukushima Prefecture will take much longer. Some people may not be able to return to their land and homes for ten years, and it may take thirty years to fully dismantle the nuclear power plant (Okamoto 2014). The act authorizing the Reconstruction Agency set a sunset date of October 2020, so the long-term commitment to revitalize Fukushima Prefecture remains unclear.

Lessons from the Kobe and Tohoku Disasters

Japan's national land-use planning programs—land readjustment, redevelopment, and collective relocation—were mostly designed for nondisaster situations, but they have been the primary conduits for moving national government funds to disaster-impacted communities. These programs emphasize infrastructure rebuilding and economic stabilization above housing and social recovery, and their use has led to large-scale replacement and rebuilding beyond just the repair of damaged structures. The emphasis on reconstruction has created new, safer building stock, but it also has resulted in major changes to the urban

form, with higher-density redevelopment in Kobe and land-raising programs in the Tohoku regions.

Following the 1995 earthquake, local leaders made a convincing case to Tokyo that the responsibility for recovery planning and implementation resided with local governments. Kobe and Hyogo Prefectures had sophisticated staff that were experienced with national planning and building regulations. In contrast, the Tohoku recovery required a national-level approach that provided substantial funding and recovery leadership that is authorized until at least 2020. This period may need to be extended to revitalize the radiation-contaminated sites in Fukushima Prefecture.

After the 2011 disaster, the central government was more generous with funding than it was in 1995. It no longer requires local governments to share in the cost of land readjustment and other recovery programs. Victims are compensated for the costs of rebuilding, displacement, and unemployment. Some worry, however, that a costly precedent has now been set without full consideration of the tremendous financial burden this places on the national government and citizens when the next huge disaster inevitably occurs.

CHAPTER 5

India: State-Managed Recovery with NGO Involvement



The old town of the historic city of Bhuj was rebuilt following the devastating Gujarat earthquake in 2001. Source: R. Olshansky (2011).

India experienced a series of major disasters from 1993 to 2004. These events catalyzed the rapid development of an emergency management system at both the national and state levels. Although the national government of India has begun to address emergency management over the past two decades, this chapter focuses on long-term recovery policies at the state level—beginning in the State of Maharashtra after the 1993 Latur earthquake and developing more fully in the State of Gujarat after its catastrophic 2001 earthquake. The State of Tamil Nadu adapted many of these lessons following the 2004 Indian Ocean tsunami.

The 2001 Gujarat Earthquake Disaster

On January 26, 2001, a magnitude 7.7 quake affected wide areas of the State of Gujarat, particularly devastating areas of Bhuj, Gandhidham, Anjar, Bhachau, and Rapar. This was the deadliest earthquake to strike India since 1935, resulting in 13,805 fatalities (Murty et al. 2005). The devastation of Bhuj “was unprecedented in the history of urban India” (Balachandran 2010, 160).

Organizing for Recovery

On February 8, 2001, approximately two weeks after the earthquake, the state established the Gujarat State Disaster Management Authority (GSDMA). The organization was modeled after the Orissa State Disaster Mitigation Authority, which was established after a 1999 cyclone in Orissa (Murty et al. 2005). Headed by the chief minister, the GSDMA had the authority to coordinate the activities of state agencies. It was tasked with planning and implementing the response and recovery, as well as developing an emergency management system for future events

(Thiruppagazh and Kumar 2010). The GSDMA also created policy, designed programs, monitored progress, and coordinated the work of other organizations.

The agency was an independent organization with its own rules that received international funds in a transparent and accountable manner. It coordinated more than 20 state government departments, the government of India, international funding agencies, UN agencies, and NGOs. In 2003, the GSDMA became a permanent body through the Gujarat State Disaster Management Act, the first such act in an Indian state.

Notable Recovery Features

NONGOVERNMENTAL ORGANIZATIONS

At the time of the earthquake, Gujarat had a strong NGO network that provided a robust foundation for recovery work. Eighty NGOs, with GSDMA approval and coordination, conducted reconstruction and rehabilitation work in 280 villages, built more than 41,000 houses and associated infrastructure, and rebuilt schools and buildings (GSDMA n.d.). With formal endorsement and support of the government, Kutch



The January 2001 earthquake was the deadliest to strike India since 1935, and the scale of urban devastation, shown here in the city of Bhuj, was unprecedented in modern Indian history. *Source: Environmental Planning Collaborative (2001). Reprinted with permission.*



Navnirman Abhiyan (Abhiyan), a local NGO network, coordinated NGO activities and established more than 25 local subcenters to provide assistance and information for 400 villages. The centers took on a variety of recovery roles; they acted as information centers, sources of government-public communications, and bridges between villages and implementing organizations. They monitored construction materials, provided technical support and legal assistance, and oversaw health issues (Abhiyan and UNDP 2001).

HOUSING

The state and the World Bank promoted a decentralized process of owner-driven, in-situ housing reconstruction as the most effective and fastest approach. (Thiruppugazh and Kumar 2010). Communities and households led the reconstruction with technical support provided by the government and NGOs. The state provided funding to owners of 82 percent of the

In 2004, a sewer line was laid in Saraf Bazaar in the heart of the old city of Bhuj as part of the land-readjustment process.

Source: B. R. Balachandran Environmental Planning Collaborative (2004). Reprinted with permission.

households, enabling them to rebuild core houses on site by themselves or to hire contractors. The government subsidized NGOs to build housing and infrastructure for other homeowners.

The emphasis on owner-driven reconstruction as the preferred mode was unprecedented in India (Thiruppugazh 2007). Owner involvement improved the quality of construction and educated owners about building practices geared to withstand seismic events. Subsequent studies confirmed that household satisfaction, reduced costs, and improved seismic safety made owner-driven reconstruction a success (Barenstein 2006).

Over 70 percent of all repair and reconstruction work was completed within two years of the earthquake (Barenstein 2006). By March 2006, more than 911,000 houses had been repaired and over 201,000 were reconstructed (GSDMA 2006). Despite this success, the speed of reconstruction may have resulted in diminished quality in some cases (Murty et al. 2005). Paradoxically, the effort to move too quickly—by announcing rehabilitation packages based on hastily completed damage assessments—may have delayed the completion of reconstruction (Murty et al. 2005).

RECONSTRUCTION OF URBAN AREAS

The four urban areas required considerable investments in infrastructure and housing. The government of Gujarat conducted individual planning studies before making decisions about reconstruction (Murty et al. 2005). Area Development Authorities (ADAs) were created in Bhuj, Bhachau, Anjar, and Rapar. Their plans emphasized safety improvements, widening of roads, provisions for open spaces, and extensions of infrastructure to provide for new urban development.

LIVELIHOOD PROGRAMS

Livelihood programs helped people restart their businesses. The government provided toolkits and loan subsidies for artisans and helped more than 13,000 small shops and industrial units. Assistance was given to over 46,000 farmers for structures and more than 78,000 farmers for irrigation equipment (Murty et al. 2005).

FINANCING

From the outset, Gujarat intended to finance a massive reconstruction program on its own, but the availability of World Bank and ADB funds provided the state with the resources it needed to build new infrastructure, retrofit undamaged public buildings, and create the disaster risk-reduction program (Thiruppugazh 2007). As of 2005, the governments of Gujarat and India

Bhuj was reconstructed following a comprehensive planning and land-readjustment process. Although the old center is now less dense, it is still a vibrant urban area. *Source: R. Olshansky (2011).*



provided \$578 million and \$109 million, respectively, and the World Bank and Asian Development Bank provided additional loans totaling \$675 million and \$377 million (Murty et al. 2005).

Lessons

The most notable innovation following the Gujarat earthquake was the wide-scale, owner-driven housing reconstruction. This increased the speed and quality of reconstruction. The policy of owner involvement owed its origins to the pioneering actions of the State of Maharashtra following the 1993 Latur earthquake. Such an approach required strong commitment and sufficient staffing to implement, but it proved to be successful and has influenced disaster recovery processes across South Asia (World Bank 2009).

Another innovation introduced in Gujarat was the partnership between the state government and NGO networks. The official governmental recognition of Abhiyan helped to create broad-based, self-

organized networks of stakeholders who were able to provide services beyond what the government could have accomplished.

Finally, the post-earthquake reconstruction created significant improvements that would not have occurred otherwise: upgraded rural and urban infrastructure, increased seismic safety of new and retrofitted buildings, new regional economic development initiatives, a resolute culture of disaster risk reduction, and, for many, a sense of empowerment. By 2006, disaster-management plans were in place in all 25 districts, 10,375 villages, and 97 urban local bodies in the state (GSDMA 2006). The Gujarat Institute of Disaster Management and Institute of Seismological Research were established. New engineering standards were enacted. These improvements better positioned the region for economic growth (Gupta et al. 2002).

The municipality of Bhachau is pictured here ten years after being devastated by the 2001 earthquake. *Source: R. Olshansky (2011).*



CHAPTER 6

Indonesia: Centrally Managed, Community-Driven Approaches to Reconstruction



Beginning with the 2004 Indian Ocean tsunami, a sequence of major disasters forced Indonesia to quickly develop highly effective recovery management organizations and innovative, community-driven planning and implementation practices.

This boat was thrown inland from the coastline during the 2004 tsunami and was kept in place as a reminder of the disaster. Source: R. Olshansky (2008).

The 2004 Sumatra Earthquake and Tsunami

The Great Sumatra-Andaman earthquake, which struck on December 26, 2004, was one of the largest earthquakes ever recorded, with a magnitude of 9.1 to 9.3 (Kanamori 2006). It was one of the most lethal, resulting in 128,645 deaths, 37,063 missing people, and 532,898 displaced people in Indonesia (U.S. Agency for International Development 2005). Approximately one-third of the city of Banda Aceh was stripped bare up to 2.5 miles (4 km) inland, and 90,000 people died in the city and its immediate vicinity (Bearak 2005).

Disaster response was complicated by the ongoing armed conflict in Aceh between the Free Aceh Movement (*Gerakan Aceh Merdeka* [GAM]) and the Republic of Indonesia (Kingsbury 2007). Under the leadership of the new president, however, the national crisis offered an opportunity for peace. Shortly after the tsunami, a ceasefire was announced, which allowed international aid to flow into the region. On December 11, 2006, Aceh held its first democratic election.

This collection of signs illustrates the large number of international NGOs operating in Aceh after the tsunami. Source: R. Olshansky (2008).



Organizing for Recovery

INITIAL PLANS

Indonesia's first step was for the national development planning agency, *Bappenas*, to perform a preliminary loss assessment in preparation for a mid-January 2005 meeting of potential international donors. Two months later, the agency released a 12-volume *Master Plan for Rehabilitation and Reconstruction of Aceh and Nias* (Republic of Indonesia 2005). Both the preliminary loss assessment and the master plan laid out principles for a community-oriented, participatory, comprehensive, and transparent process to be coordinated at all levels. The plans contained policies for reconstructing the community, economy, infrastructure, housing, and governance.

At the time, it was a bold step to orient recovery management around community engagement. But the plan's authors recognized that although "participatory processes are often slower than top-down alternatives, they are more effective over the long term because the plans have full community support" (BRR 2005, 7). Indonesia, specifically Aceh, pioneered community-driven development (CDD) projects prior to the tsunami. The Kecamatan Development Project (KDP) and the Urban Poverty Project (UPP), for example, had been operating in Indonesia since 1998 and were readily adapted for post-tsunami recovery.



RECOVERY ORGANIZATIONS— MDF AND BRR

The Master Plan set into motion the establishment of two key recovery organizations within the Indonesian government: the Multi-Donor Trust Fund (MDF) to collectively manage international donations and the ministerial-level Reconstruction and Rehabilitation Agency (*Badan Rehabilitasi dan Rekonstruksi* [BRR]). The two new organizations were designed to work together to plan and implement recovery projects.

The BRR, established in April 2005, shaped the recovery process over the next four years. It consisted of three entities, each reporting directly to the president: (1) a full-time implementing agency (*Badan Pelaksana* or *Bapel*); (2) a 15-member advisory board (*Dewan Pengarah*); and (3) a 9-member oversight board (*Dewan Pengawas*) to monitor and evaluate the BRR and to handle public complaints (World Bank 2005). The BRR had the authority to assemble a team as needed to ensure speed, integrity, and high reconstruction standards.

Initially, the BRR's primary goals were to reconstruct housing and infrastructure and to build local government capacity. A significant moment in long-term

Most of the damaged housing in Banda Aceh was reconstructed within five years of the tsunami. *Source: R. Olshansky (2008).*

recovery planning was the August 15 signing in Helsinki of the peace agreement between GAM and the Government of Indonesia. The accord meant that all areas in Aceh could now be accessed by relief and reconstruction organizations (BRR 2005).

To coordinate nearly 500 recovery organizations, the BRR initiated an approval process for every project, created a database of projects, and held a coordination forum in October 2005. Local governments tended to defer to the NGOs, which, at that time, had direct access to more funds than government-sponsored entities had. The diverse styles and abilities of the NGOs, however, created inconsistencies and challenged coordination. Thus, because of the limited capacity of local governments, the BRR began to directly hire contractors to construct housing to fill identified needs. It also began to provide block grants to district governments (BRR 2005).

A priority of BRR was to collect and manage data. More importantly, it supported frequent monitoring and evaluation by both internal and external entities. As a result, recovery policies and priorities evolved

based on documented needs, and the BRR reorganized its structure every six to twelve months to fit these needs. The continuing process of self-reflection led to ongoing innovation.

The greatest challenge the BRR faced was managing the tension between taking a more active role and trying to increase local government capacity, with the understanding that the BRR, as a reconstruction agency, would dissolve in 2009. The BRR also recognized the tension between speed and deliberation: “To ensure all stakeholders have a chance to be heard entails extensive, and therefore time-consuming, consultation. However, if the deliberations take too long this unique opportunity may be lost. So the challenge for planning the long-term strategy must be to ‘make cautious haste’” (BRR 2005, 173).

Notable Recovery Features

COMMUNITY-BASED DEVELOPMENT AND REKOMPAK

The Community-Based Settlement Rehabilitation and Reconstruction Project (*Rehabilitasi dan Rekonstruksi Masyarakat dan Pemukiman Berbasis Komunitas, [Rekompak]*) was an innovative program that contractually involved the community throughout the entire reconstruction. Given the unprecedented scale of the damages, reliance on a community-based approach was a bit of a risk, and there were many dissenters at the time (Multi-Donor Fund for Aceh and Nias, and Java Reconstruction Fund 2012). Although it was initiated as an experiment, community contracting has become a highly successful method for reconstruction that has been applied to a succession of Indonesian disasters over the past decade.



Less than four years after the tsunami, the fishing harbor and market were vibrant places once again. Source: R. Olshansky (2008).



In Yogyakarta, new homes were constructed adjacent to those that were damaged by the 2006 earthquake. Source: R. Olshansky (2008).

Rekompak represented an expansion of KDP and UPP, which used block grants for community facilities, to also include private housing and a much larger set of villages. In *Rekompak*, community members organized into groups, with each group assisted by a facilitator. The group aspect furthered the principles of transparency and accountability. Facilitators became two-way communication links to the government, explaining government policies to the residents and expressing to the government the needs of the community. A key component was a community spatial plan that served as the guiding document for rebuilding housing and public facilities in each village. Eventually, *Rekompak* included 130 villages in Aceh (BRR 2009a).

ACEH RECONSTRUCTION OUTCOMES

During the four years of BRR, Aceh saw the construction of 140,304 permanent houses; 3,696 kilometers of roads; 1,759 schools; 1,115 health facilities; 23 ports; and 13 airports. The agency also reclaimed agricultural land, trained nearly 40,000 teachers, and provided more than 7,000 fishing boats (BRR 2009a). The BRR built 39 percent of the housing units with Indonesian government funding; approximately 140 NGOs built the other 61 percent (BRR 2009a). In April 2009, the BRR reached the end of its four-year life, and its responsibilities passed to local, provincial, and central government agencies. At the time of this writing, Aceh is a peaceful place with a much stronger economy and more capable government than it had at the time of the disaster.

APPLYING THE ACEH MODEL AFTER THE 2006 JAVA EARTHQUAKE

On May 27, 2006, while the nation was still overwhelmed with Aceh's recovery, an earthquake struck central Java near the culturally important city of Yogyakarta. Although its magnitude was only 6.3, it destroyed approximately 154,000 houses and damaged 260,000—more than the toll of the 2004 tsunami (Bappenas et al. 2006). The earthquake also affected 30,000 enterprises resulting in job losses. One of the most notable features of the recovery was the resolute decision, right from the start, to emphasize community-based housing reconstruction using Aceh's *Rekompak* model.

The president created the Coordination Team for Rehabilitation and Reconstruction for Yogyakarta and Central Java to monitor and evaluate implementation of the action plan. In effect, this team was the equivalent of the BRR; its role was to improve coordination and communication between the national and local governments. Replicating the successful organization of the MDF, international donors established the Java Reconstruction Fund (JRF) to manage and coordinate the application of reconstruction funds (Java Reconstruction Fund 2012).

Two years after the earthquake, 300,000 houses had been completed, making the effort one of the fastest housing reconstruction projects in the world

(Multi-Donor Fund for Aceh and Nias, and Java Reconstruction Fund 2012). Studies showed that most of the government-funded housing was generally well constructed despite being built so quickly, although many structures did not meet all the desired seismic-design principles (International Recovery Platform 2009).

FORMALIZATION OF DISASTER MANAGEMENT

In 2007, Indonesia created the new National Disaster Management Agency (*Badan Nasional Penanggulangan Bencana [BNPB]*). In addition, Indonesia mandated that all provinces and municipalities establish regional disaster management agencies (*Badan Nasional Penanggulangan Bencana Daerah [BPBD]*). This new structure departed from the previous focus on emergency response and emphasized risk reduction as well. The new laws specified BNPB's role in post-disaster recovery, defined recovery functions, and described budget responsibilities (UNDP and BNPB 2009).

Lessons

The BRR, conscious of its pioneering efforts, was remarkably reflective about its own strengths and weaknesses. Eager to share its hard-earned lessons, the BRR offered 10 Management Lessons for Host Governments Coordinating Post-Disaster Reconstruction (BRR 2009b):

Organize

1. Quickly establish a coordinating agency with adequate powers.
2. Appoint a strong, experienced leadership team to gain full support of other government agencies and the donor community.
3. Maintain a “crisis mindset” through the entire reconstruction effort.
4. Build a strong implementation plan to enable the coordinating agency to fill reconstruction gaps.

Execute

5. First meet basic needs, fill gaps in the supply chain, build a coordination war room, and involve affected communities in reconstruction.
6. “Build back better” at every opportunity.
7. Utilize key partner agencies to play supporting coordination roles.
8. Use constant communication to manage beneficiary and donor expectations about the pace and progress of reconstruction.

Fund

9. Ensure integrity and accountability of funds to gain donor confidence and support.
10. Mix diplomacy, authority, and flexibility to ensure that funding flows meet actual needs.

The BRR's self-reflections on the crisis mindset are worth discussing. The agency tried to manage processes in parallel, rather than in sequence. Speed is obviously critical, but speed needs to be balanced against its costs. BRR states:

Be explicit in acknowledging the inevitable trade-offs between speed and quality. One of BRR's strongest operating principles was to prevent letting the perfect become the enemy of the good. . . . The trade-off between speed and quality is dynamic, and must be continually reassessed. With smaller, short-term projects, speed may be the paramount concern, but quality becomes more important for longer-term projects. (BRR 2009b, 27)

CHAPTER 7

United States: An Evolving National Recovery Policy Centralized at Federal and State Levels



One of the long-standing principles of federalism in the United States has been that disaster response and recovery is primarily the responsibility of local and state governments. From this premise, it follows that federal assistance should supplement, not supplant, nonfederal efforts. Within a decade, three large-scale, catastrophic urban disasters—the 2001 terrorist attacks, 2005 Hurricane Katrina, and 2011 Hurricane Sandy—demonstrated significant gaps in the disaster policy framework that had evolved over 50 years (Rubin 2012). These more recent disasters led to the centralization of post-disaster recovery governance at both the national and state levels. This shift may have some perverse long-term effects by reducing the recovery authority of local governments and the influence of local citizenry.

Reconstruction is pictured here at the site of the World Trade Center.
Source: L. Johnson (2004).

Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), the Federal Emergency Management Agency (FEMA) is the lead agency to coordinate the federal government's role in preparing for, responding to, mitigating, and recovering from the effects of all domestic disasters. FEMA also administers the federal government's recovery-related programs defined by the Stafford Act, including individual assistance, public assistance, and the Hazard Mitigation Grant Program (HMGP). Other federal agencies with potentially significant roles and resources include the Department of Housing and Urban Development (HUD), Small Business Administration (SBA), Economic Development Administration (EDA), and the Department of Transportation (DOT).

In the aftermath of presidentially declared disasters, the U.S. Congress also supplements the Stafford Act allocations with a variety of funding programs and options, including grants, tax credits, and loans to help states and local governments finance recovery efforts. One rapidly growing piece of Congress's disaster recovery toolkit is the HUD Community Development Block Grant-Disaster Recovery (CDBG-DR) Program. It was first used by Congress in fiscal year 1993 to provide supplemental disaster recovery funds following Hurricanes Andrew and Iniki. Since that time, Congress has appropriated almost \$48 billion for post-disaster grants (HUD 2014). These grants have moved beyond traditional disaster relief by funding long-term recovery and reconstruction activities, including the reconstruction and improvement of businesses, homes, and infrastructure.

In addition, the National Flood Insurance Program (NFIP) is one of the largest federally funded disaster recovery programs, although it is, in principle, funded by flood-prone property owners. Nearly six million policy holders pay an estimated \$3.6 billion in annual premiums for flood insurance (King 2013). In addition to providing insurance settlements to property owners for their flood losses, the NFIP has, since 1993, played

another important role in post-flood recovery by providing funds for buyouts of flood-prone properties.

The 2001 World Trade Center Disaster

September 11, 2001, was a major turning point in U.S. disaster management that is still influencing disaster policy and actions. The terrorist attacks on the Pentagon and the World Trade Center in Lower Manhattan as well as the downed jet airplane in Pennsylvania killed 2,977 people. Many more suffered long-term mental and physical health effects. The attacks caused over \$100 billion in direct and indirect economic losses to the U.S. economy. The total insurance claims payments exceeded \$35 billion, including property, life, and liability insurance claims (Rose et al. 2009; Valverde and Hartwig 2006).

Organizing for Recovery

The U.S. federal government was a primary funder of the World Trade Center recovery and rebuilding effort. Its commitment and approach to providing post-disaster assistance was swift, innovative, and flexible. More than \$20.5 billion in federal assistance was provided; about \$11.35 billion went to rebuilding and development in Lower Manhattan (NYCIBO 2011). Together, FEMA, HUD, and the Department of Transportation provided over 95 percent of the direct federal aid to the New York City area. For all three agencies, it was the highest level of assistance that each had ever provided for any single disaster. In addition to more than \$20 billion in direct federal aid, Congress also approved up to \$9.8 billion in compensation to survivors, relatives, and businesses that suffered losses in the attacks (NYCIBO 2011).

The State of New York and New York City jointly formed the Lower Manhattan Redevelopment Corporation, later renamed the Lower Manhattan Development



Surrounding buildings are reflected in one of the twin pools at the World Trade Center Memorial Park. *Source: R. Olshansky (2015).*

Corporation, as a subsidiary of the state's leading economic development agency, the Empire State Development Commission. The agency was governed by a board of directors jointly appointed by New York's governor and New York City's mayor. It was charged with overseeing all aspects of revitalizing and rebuilding Lower Manhattan, including improving transportation and other infrastructure, constructing and developing areas affected by the terrorist attacks, and attracting and retaining businesses. It also managed much of the federal HUD CDBG-DR funds.

Additionally, the New York City Economic Development Corporation led several programs funded by CDBG-DR for business recovery and economic development. The New York Department of Transportation received federal funding to redesign and rebuild all streets and sidewalks at the World Trade Center site.

Notable Recovery Features

REBUILDING THE WORLD TRADE CENTER COMPLEX AND LOWER MANHATTAN

Seven World Trade Center was the first building in the former World Trade Center complex to be rebuilt; it opened in 2006. On the tenth anniversary of the attacks, the National Memorial park was dedicated in a ceremony for the victims' families and opened to the public the following day. Four World Trade Center opened in November 2013; The National September 11 Memorial Museum opened in May 2014; and 1 World Trade Center—the Freedom Tower—opened in November 2014. Work on the World Trade Center Transportation Hub was scheduled to be completed in March 2016.

Since 2001, Lower Manhattan's economy has diversified beyond the financial industry to attract technology, advertising, media businesses, and considerable increases in residential and hotel units. This expansion has been stimulated by federal, state, and local funds and tax credits.

IMPORTANT FEDERAL REFORMS

In 2002, Congress created the Department of Homeland Security (DHS), which absorbed FEMA and its former cabinet-level position in the federal government. In December 2004, DHS released a new National Response Plan (NRP) that included an Emergency Support Function (ESF #14) for Long-Term Community Recovery, which was the first explicit initiative to systematize federal support of long-term community recovery. Over time, it provided federally funded, community-based planning after a host of disasters between 2005 and 2011 (FEMA 2011).

The 2005 Hurricanes Katrina and Rita

Combined, the 2005 Hurricanes Katrina and Rita caused over 1,800 deaths, destroyed over 300,000 housing units, and resulted in capital losses estimated between \$70 and \$150 billion (GAO 2007). By nearly every measure, Hurricane Katrina was the most destructive and costliest natural disaster in American history; Rita was the third costliest at the time. FEMA had more than 1.7 million registrants for its Individual Assistance Program and over 400,000 applied for federal transitional housing assistance (Kates et al. 2006). Over 400,000 jobs were initially lost, including many from one of the region's major employers: the oil and gas industry (GAO 2007). In all, the federal government committed more than \$110 billion in assistance for the 2005 hurricanes (GAO 2007).



As seen in October 2005, storm surge and levee failures from Hurricane Katrina flooded homes and cars throughout New Orleans and neighboring St. Bernard Parish. *Source: L. Johnson (2005).*

Organizing for Recovery

The federal disaster declaration areas for Hurricanes Katrina and Rita were quite vast, covering parts of Alabama, Florida, Louisiana, Mississippi, and Texas. Nearly every state in the nation received presidential emergency declarations to support Hurricane Katrina evacuees. Presidential Executive Order 13390 created the position of coordinator of federal support for the recovery and rebuilding of the Gulf Coast region, reporting to the secretary for homeland security to govern recovery efforts and to serve as the principal contact within the executive branch. FEMA established a position of deputy director for Gulf Coast recovery to coordinate FEMA programs in five states, while the Office of the Federal Coordinator for Gulf Coast Rebuilding coordinated the long-term recovery of the Gulf Coast region among all federal departments and programs.

At the state level, Mississippi and Louisiana established the Mississippi Governor's Office of Recovery and Renewal and the Louisiana Recovery Authority. The Mississippi Governor's Office of Recovery and Renewal designed various recovery programs and approaches to rebuilding (GAO 2009; Smith 2011). The Disaster Recovery Division was established in the Mississippi Development Authority to manage \$5.5 billion in CDBG-DR funds and implement policies established by the Governor's Office of Recovery and Renewal. The Mississippi Emergency Management Agency managed the administration of FEMA funds that included more than \$1.3 billion in individual assistance, \$364 million for Hazard Mitigation Grant Program projects, and more than \$3.2 billion in public assistance to rebuild infrastructure and reimburse local governments for debris removal and other emergency measures (FEMA 2014).

The Louisiana Recovery Authority (LRA), modeled in part after the Lower Manhattan Development Corporation, secured funding, established principles and policies for redevelopment, led long-term community and regional planning, ensured transparency and accountability, and communicated recovery progress. The LRA was led by a board of directors whose 33 members were diverse, bipartisan civic and national leaders from impacted communities.

The LRA established spending priorities and program designs that were subject to the approval of the state legislature. LRA staff worked with other state agencies that received funding to manage various recovery programs. Two key agencies were the Louisiana Office of Community Development (OCD) and the Governor's Office of Homeland Security and Emergency Preparedness (GOSHEP). The OCD established a disaster recovery unit to manage \$13.4 billion in CDBG-DR funds and GOSHEP-administered FEMA funds, including \$11.9 billion for infrastructure repairs and local government reimbursements (FEMA 2013). The LRA sunset on June 30, 2010 was prescribed

by legislation. The LRA staff merged with the OCD's disaster recovery unit, which continues to administer and monitor the CDBG-DR funds.

Olshansky and Johnson (2010) chronicled the recovery planning efforts in the City of New Orleans beginning with the mayor's Bring New Orleans Back Commission and its report released in January 2006, the packaging of the Unified New Orleans Plan (UNOP), and the newly formed Office of Recovery Management's New Orleans Strategic Recovery and Redevelopment Plan, which the city council approved and the LRA accepted in the summer of 2007.

The Office of Recovery Management oversaw the financing and implementation of all public recovery initiatives. The office later merged with other city agencies to become the Office of Recovery Development and Administration (ORDA) and, by late 2008, along with the Chief Administrator's Office, it was managing \$1.1 billion to repair city-owned buildings, facilities, and streets (City of New Orleans 2008). The New Orleans Redevelopment Authority (NORA) was infused with new leadership who took a significant role in revitalizing blighted and abandoned properties throughout the city. Together, ORDA and NORA worked on hazard mitigation: elevating buildings, purchasing permanent open space in low-lying areas, obtaining flood-prone lands through land swaps, and improving construction techniques.

Notable Recovery Features

POST-DISASTER RECOVERY PLANNING

The 2005 hurricanes marked the first real use of the National Response Plan's Emergency Support Function-14 (ESF-14) Long-Term Community Recovery. In 2005 and 2006, FEMA, along with a cadre of planning contractors, worked with communities across the Gulf Coast to identify recovery projects, provide project funding, and implement strategies. The state's



Louisiana Speaks planning effort, initially funded by private foundations, partnered with the FEMA ESF-14 and required each parish to prepare a plan with a prioritized list of recovery projects that other federal agencies might fund. The LRA then made available \$700 million in CDBG-DR funds for community improvement projects only to parishes with LRA-accepted plans. The LRA also led a planning process for Southeast Louisiana—the Louisiana Speaks Regional Plan—that emphasized smart growth, coastal restoration, and regional economic development (LRA 2007).

LARGE-SCALE HOUSING REPAIR PROGRAMS

Mississippi and Louisiana used large portions of their CDBG-DR funds for housing repairs. Mississippi directed \$3.85 billion of CDBG-DR funds toward housing recovery (Mississippi Development Authority 2014). The Homeowner’s Assistance Program paid more than \$2 billion in individual grants of up to \$150,000 to over 27,750 homeowners, and also provided over 1,100 home elevation grants totaling \$46.5 million. The state also had programs for rental housing, workforce housing, affordable housing units, and residential insurance costs.

Louisiana’s \$10 billion housing program, called the Road Home, paid more than \$8.53 billion directly to

This rebuilt home sits next to the repaired 17th Street Canal in the Lakewood district of New Orleans. The Lot Next Door program allowed homeowners to purchase publicly-owned lots adjoining their own land before the lots were offered to other buyers.

Source: L. Johnson (2014).

approximately 128,000 homeowners to repair their properties or to sell them to the state (LRA 2010). This included more than \$876 million in funds to elevate homes, which came from a combination of CDBG-DR and FEMA HMGP funds. There were also programs for rental housing and affordable housing. Although these funds were crucial in helping Louisiana to rebuild, the size and complexity of the program created numerous problems, such as costly and error-ridden administration and public challenges to the equity of its policies (Green and Olshansky 2012).

IMPORTANT FEDERAL REFORMS

In October 2006, Congress passed the Post-Katrina Emergency Management Reform Act, which increased FEMA’s autonomy within DHS and called for the National Disaster Recovery Strategy and a National Disaster Housing Strategy within 270 days after the act was passed. In January 2009, FEMA released the final National Disaster Housing Strategy, setting a new direction for interim and permanent housing (FEMA 2009).

In 2011, FEMA released the National Disaster Recovery Framework (NDRF), which was the first national recovery policy that defined measures of recovery success and specifically identified local governments as having the primary role in recovery (FEMA 2011). The framework emphasized the importance of recovery planning and expanded the FEMA long-term community recovery planning functions of ESF-14. Its goals were to improve state and local capacity by coordinating programs across the federal government and to promote the importance of hazard mitigation before and after disasters.

The 2012 Hurricane Sandy

Hurricane Sandy made landfall in southern New Jersey on the evening of October 29, 2012, and wreaked havoc across much of the northeastern United States with heavy rain, strong winds, and record storm surges. In all, the storm resulted in 159 deaths; cut power to 8 million customers; closed roadways, transit, rail, airports, and ports for extended periods of time; displaced

26,000 people in 16 states; damaged over 650,000 homes; and caused long-term housing displacements for an estimated 200,000 people (Fugate 2012; Hurricane Sandy Rebuilding Task Force 2013).

Organizing for Recovery

Thirteen states and four tribal organizations received federal disaster declarations. FEMA activated all six Recovery Support Functions (RSFs) outlined in the NDRF in New York, New Jersey, and Connecticut. The agency appointed recovery coordinators for the most heavily impacted states. FEMA maintains recovery field offices in New York and New Jersey.

On December 7, 2012, President Obama issued an executive order forming the Hurricane Sandy Rebuild-

Hurricane Sandy caused major damage to homes and infrastructure on Staten Island as seen in January, three months after the storm. *Source: L. Johnson (2013).*



ing Task Force. The group consisted of representatives from all relevant federal agencies and an advisory group of elected leaders from the most affected areas. It was charged with supporting rebuilding efforts “that address economic conditions and the region’s aged infrastructure . . . and identify the requirements and resources necessary to bring these systems to a more resilient condition given both current and future risks” (White House 2012). In August, 2013, the task force published 69 policy recommendations (Hurricane Sandy Rebuilding Task Force 2013).

Congress approved a \$50.5 billion package of disaster assistance in late January 2013. It included \$16 billion in CDBG-DR funds for New York City and the states of New York and New Jersey; \$13 billion for the Department of Transportation to repair highways, railways, and public transport; \$11.5 billion for the FEMA programs; and \$5.4 billion for the U.S. Army Corps of Engineers to repair, restore, and rehabilitate coastal properties and to provide flood protection (Painter and Brown 2013).

New York City and the states of New York and New Jersey established special recovery governance. The two state recovery organizations report to the governors and provide policy leadership and coordination for the states’ recovery programs. The New Jersey Governor’s Office of Recovery and Rebuilding oversees the planning and allocation of \$3.8 billion in CDBG-DR funds (New Jersey 2015). New Jersey’s Department of Community Affairs leads the state’s housing recovery programs funded by CDBG-DR; the New Jersey Economic Development Authority heads the state’s CDBG-DR economic development programs funded by CDBG-DR; and the New Jersey Office of Emergency Management administers the FEMA programs.

The New York Governor’s Office of Storm Recovery (GOSR) was established to centralize the state’s rebuilding efforts for Hurricane Sandy, Hurricane Irene, and Tropical Storm Lee. The office manages approx-

imately \$3.8 billion in CDBG-DR funds (GOSR 2015). The New York State Division of Homeland Security and Emergency Services assists with the management of the FEMA funding programs.

New York City estimates that \$13.4 billion of the federal funding for Hurricane Sandy has been earmarked for projects (NYC Recovery 2015). The city has managed about \$11 billion in federally funded programs, namely with FEMA Public Assistance and HUD CDBG-DR funds. The remaining funds have been administered directly by federal agencies such as the U.S. Army Corps of Engineers and the Small Business Administration. New York is the only Sandy-impacted city allowed to apply directly to HUD for CDBG-DR funds. The city established the Housing Recovery Office that worked with FEMA to implement a pilot program called STEP (Sheltering and Temporary Essential Power) that restored heat, hot water, and electricity in nearly 20,000 residential units in the first 120 days after the storm. New York City’s mayor also convened the Special Initiative for Rebuilding and Resiliency (SIRR) to analyze the storm’s impacts on buildings, infrastructure, and people; assess the city’s risks from climate change in the medium and long term; and outline strategies to increase resiliency (PlaNYC 2013).

Notable Recovery Features

LARGE-SCALE HOUSING REPAIR PROGRAMS

New York City and the states of New York and New Jersey designed and implemented housing repair programs with their CDBG-DR funds. All three programs fund single-family homeowner repairs, rehabilitation, mitigation, elevations, and multifamily rental repairs. Both states have had voluntary home buyout and acquisition initiatives. New York City has directed funds to improve its public housing infrastructure.



In October 2013, housing repairs involving floor elevations to mitigate future flood risks were underway in the Borough of Sea Bright, New Jersey. Source: L. Johnson (2013).

INNOVATIVE FEDERAL, STATE, AND LOCAL RECOVERY PLANNING

In June 2013, the Hurricane Sandy Rebuilding Task Force launched “Rebuild by Design,” a regional design competition to promote innovation by developing construction plans that increase resilience. HUD set aside \$1 billion of post-Sandy CDBG-DR funds as seed capital for the winning projects. The program enlisted the support of the philanthropic community, particularly the Rockefeller Foundation, which provided \$3 million (Lochhead 2014; Martin 2015). Out of nearly 150 submissions, 10 multidisciplinary design teams were selected. In June 2014, six projects were selected as the winners, and the long process of turning the designs into actionable public infrastructure projects began (Martin 2015).

Also in June 2013, New York City released a plan entitled “A Stronger, More Resilient New York,” which included 257 initiatives to strengthen the coast, upgrade the city’s building stock, protect critical infrastructure and services, and make neighborhoods

safer and more resilient (PlaNYC 2013). The city allocated \$1.385 billion in CDBG-DR funds that are coordinated by the new Office of Recovery and Resiliency (NYC Recovery 2015).

In March 2014, New York’s Governor Cuomo launched the Community Reconstruction Zone Program (now called the NY Rising Community Reconstruction Program) to enable communities to develop recovery plans that focus on current damage, future threats, and economic opportunities. FEMA’s Community Planning and Capacity Building team collaborated with the state to develop the program. Each community established a local committee, and the state provided each with a planning team, tools, and guidelines to prepare the plans. Communities that successfully completed a recovery plan were then eligible for up to \$25 million from the \$650 million in CDBG-DR funds set aside for the program to implement their plans; at least \$250 million in the FEMA Hazard Mitigation Grant Program funds were also available (Cuomo 2013). By January 2015, 66 committees representing more than 100 communities were participating in the program (GOSR 2015).

Lessons from the 2001, 2005, and 2012 Disasters

As exhibited through these diverse approaches, the federal government continues to seek a model for recovery that is responsive to victims' needs and mindful of the nation's purse. The goal after each of these disasters was to speed the flow of money to allow for timely reconstruction while still providing accountability.

The World Trade Center disaster is notable because of the swift federal commitment of funds and reduction of bureaucratic red tape during the recovery. Yet it did not become the model for future policy, perhaps because of several unique conditions and characteristics: (1) Congress and the nation were astonished by the devastation and were generous in their support; (2) New York City is the nation's leading financial center; (3) New York has sophisticated and experienced local and state governments with more capability than most; and (4) the governor and mayor were effective leaders and of the same political party as the White House.

After Hurricane Katrina, extremely large sums of federal money needed to flow to state and local governments through a variety of programs, so capability, trust, and accountability were crucial. Louisiana and New Orleans had great needs and expectations, but lacked sophisticated, experienced, and effective leaders who were aligned with the White House. Mississippi did have effective leaders and strong ties to the White House, which created further tension between the states and strained their interactions with the federal government.

Hurricane Sandy presented an opportunity to test refinements made in the model of federal recovery, including the first full-scale multistate implementation of the new National Disaster Recovery Frame-

work. The Hurricane Sandy Rebuilding Task Force was an attempt to enhance coordination among a number of large federal programs. The resulting strategy also stressed the importance of viewing the post-Sandy reconstruction process as part of a broader context that required action on climate change adaptation and long-term risk reduction.

Even with this effort to coordinate, the federal recovery framework is still complicated and disconnected. Better integration is needed across federal programs, particularly between FEMA and HUD. Additionally, more action needs to be taken to reduce risk before disasters strike.

These cases illustrate the growing federal role in post-disaster recovery policy, priority setting, and funding. Yet the federal government has been of two minds about its role. Although its policy emphasizes the importance of local leadership during recovery, when large disasters strike, Congress and the White House feel compelled to provide considerable aid. With Washington's diminishing pool of discretionary funding, post-disaster recovery, especially through the CDBG-DR program, may be one of the last forms of direct and tangible assistance that Washington's elected officials can provide to their home towns and states (Katz 2014).

Over time, planning and setting priorities for recovery have been centralized at the state level, largely driven by HUD's CDBG-DR funding. This has been at the expense of local involvement in recovery decisions, but the organizations established by the states of Louisiana, Mississippi, New York, and New Jersey all provide good examples of planning, policy, priority-setting, communication, attention to local capabilities, and capacity building. Still, each of these states has faced criticism from local governments, homeowners, and businesses that have experienced extended recovery delays and mired bureaucracy.

CHAPTER 8

Conclusions and Recommendations



The Challenges of Recovery

Post-disaster recovery is a time of extreme collective uncertainty. The most important goal of recovery management should be to reduce this uncertainty by finding funds, establishing procedures, providing information, and actively involving all stakeholders so they can help inform good decision making and policy design while gaining information and the clarity to act. Various coordinating organizations inevitably emerge during the complex periods of post-disaster recovery, and they all face common challenges: to manage the flow of money and information, support collaboration at all levels, and strike a balance between speed and deliberation within a compressed time.

People gathered for a local competition at Cathedral Square in Christchurch, New Zealand. The historic Canterbury Cathedral was damaged repeatedly by the Canterbury earthquake sequence and, as of early 2016, its future remains uncertain. Source: L. Johnson (2015).

MANAGING MONEY

Source and distribute recovery funding efficiently, effectively, and equitably.

The need for large infusions of money is at the heart of recovery. Quick access to public and private funds is required to rebuild and replace lost infrastructure, homes, and businesses. For example, U.S. states called upon Congress to provide funds for permanent reconstruction; the Chinese government told eastern provinces to allocate a portion of their budgets to help the stricken western counties; Indonesia asked for help from international donors after the 2004 tsunami; and the national government of New Zealand became concerned about its current and future obligations under its insurance program. Most, if not all, of the power over the recovery process resides with the level of government that controls the acquisition, allocation, disbursement, and audit of public funds.

The most important functions of recovery organizations, whether they are new or rearrangements of existing entities, are to convince donors to provide money, develop policies on how to spend the money, distribute funds, and monitor and audit the outcomes. The organizations must establish accounting systems for timely disbursement of critical financing, ensure transparency, and minimize corruption. Money always flows to disaster-affected localities with strings attached. Requirements for accountability and governance reforms as conditions for funding can lead to permanent improvements in government. Funders also expect to see work that lowers the risk of future disasters.

INCREASING INFORMATION FLOWS

Gather, integrate, and disseminate information effectively to enhance decision making and actions by all recovery actors.

Often, recovery actors must work without full awareness of what others are doing and without current technical information. A critical role for recovery management organizations is to increase information flows among the recovery actors to highlight the evolving reconstruction activities and emergent opportunities. Well-organized communication channels can facilitate the spread of innovations and convey citizen concerns to government agencies in a timely manner. Mechanisms that create effective communication include newsletters, websites, data centers and clearinghouses, organizations that involve directors from multiple agencies, regular meetings of representatives from governmental and/or nongovernmental organizations, and paid neighborhood planners or liaisons.

The BRR in Aceh viewed information management as one of its primary functions. They created databases of projects and NGOs and posted them online. In India, a key function of the widely successful subcenters was their role as information centers to facilitate communication among government, villages, and construction organizations. In the United States, the Hurricane Sandy Rebuilding Task Force, consisting of cabinet members, increased the flow of information among federal agencies.

SUPPORTING COLLABORATION

Build sustainable capacity and capability for long-term recovery through genuine collaboration and coordination, both horizontally and vertically, among different levels of government.

Successful recovery management organizations empower networks to build capacity throughout society. In Gujarat, India, the GSDMA coordinated and supported the work of NGOs, including the Abhiyan network, which coordinated and assisted local organizations. In several cases—Kobe and the Tohoku region of Japan;



Approximately 200,000 housing units, such as these in Bhuj, were reconstructed after the 2001 earthquake.

Source: R. Olshansky (2011).

Louisiana, New York, and New Jersey in the United States; Aceh and Yogyakarta in Indonesia; and Gujarat and Maharashtra in India—government or government-sponsored recovery organizations paid planners or facilitators to help communities rebuild and plan for their future.

Horizontally organized representatives of existing government agencies can promote coordination and information sharing, allowing individual offices to adapt to new post-disaster contexts while remaining responsible to their parent organizations. Conversely, vertically organized hierarchical agencies, with clear organizational charts and streamlined channels of communication, are usually not suited to manage disaster recovery because the lack of connection between vertical hierarchies limits collaboration.

China presents an intriguing contrast. Although the top-down system was responsible for rapid physical reconstruction, it often overlooked social and economic recovery issues, and it was not designed to build local capacity or empower residents. But China's pairing system is also one of the best examples of intentionally distributed capacity; in this case, the central government distributed responsibility to unaffected parts of the country, which in turn were able to share resources and work with local governments in the recovery areas to help rebuild.

BALANCING TIME CONSTRAINTS

Meet the immediate and pressing local needs for recovery while capitalizing on opportunities for long-term betterment.

Governments face a balancing act as they confront the tensions between speed and deliberation, and between restoration and betterment. One way to

reconcile these opposing demands is to maximize information flows to increase the effectiveness of recovery processes without slowing them down.

Governments also can attain both speed and improvement by streamlining normal bureaucratic processes, as long as quality is not compromised. If a recovery organization has the authority to facilitate or compel governmental agencies to cooperate more effectively, it can simplify the bureaucracy. Japan accomplished this with the authority granted to the National Reconstruction Agency.

Observers have noted, though, that sometimes there is the paradoxical need to slow down initially in order to proceed faster later on (Chandrasekhar, Zhang, and Xiao 2014).

Recommendations for Recovery

After a large disaster, officials at all levels of government face several important questions:

- How should they begin? What should they do first?
- Do they need to develop a plan before beginning to facilitate reconstruction or can they plan (deliberate) as they go?
- How should they coordinate the many actors, including government agencies, at various levels?
- How can they streamline funding mechanisms while also requiring accountability?
- To what extent can they facilitate significant change from the pre-disaster state?
- What should they do if the disaster is so big that it reduces local capacity? Do higher governmental levels need to take control or should they engage in building the capacity of lower government levels?

In response to these and related concerns, the following general recommendations provide guidance for government organizations faced with the challenges of recovery. Many of these recommendations overlap and, collectively, they reflect a common set of principles: primacy of information, stakeholder involvement, and transparency.

Recommendation 1: Enhance existing systems and structures to promote information flow and collaboration.

The role of governmental recovery offices is to inform, support, influence, and manage the many recovery actors. Conventional bureaucratic organizations and policies are not designed to deal with the compressed time frame of the post-disaster environment. As a result, the need arises for organizational enhancements and new approaches to planning, managing, and financing recovery. New NGOs often emerge to fill roles unsuited to government bureaucracies.

The most effective type of recovery organization is one that coordinates and supports existing agencies in doing what they do best. The recovery organization adds value not in performing a radical new function, but by helping existing public and private organizations to perform more effectively during the period of time compression.

If governments propose new operations beyond the bounds of their experience, they should consider the time and financial requirements needed to fulfill these functions. For example, the housing repair programs in Louisiana and the land-buyout program in New Zealand were beset by public controversy, investigations, and court challenges because their communities failed to anticipate the demands of these large-scale operations.

Recommendation 2: Emphasize data management, communication, transparency, and accountability.

Transparent communication should underlie all recovery management policies and actions. Frequent and honest reports from recovery management organizations help to build trust between the government and the community. Recovery management organizations should create public databases for all projects to promote openness and equity at the local level. The BRR in Indonesia, for example, placed a priority on collecting, managing, and providing data to the public.

Recommendation 3: Plan and act simultaneously.

Although planning needs to begin right away, it should not consume time and resources that should be directed toward reconstruction. Deliberation and action need to occur simultaneously, and both require continuous monitoring, evaluating, and correcting. Three ways to accomplish this are to

- increase planning capacity by hiring more staff and encouraging more citizen involvement so that planning can continue without delaying action;
- decentralize information gathering and decision processes so that numerous local entities can deliberate and act; and
- act on issues that require less effort and delay action only in the small number of particularly troublesome areas.

To be fast and smart, decision making must be distributed among all the recovery actors and fully take advantage of local knowledge and local capacity.

China's pairing system is a good example of both decentralization and increased planning capacity. Several of the cases in this report, including Gujarat, Kobe, Yogyakarta, and the United States, demonstrate how to increase planning capacity by hiring local community planners. Kobe's characterization of disaster restoration areas and New Zealand's liquefaction hazard zones illustrate how planning decisions can be iterated over time, based on damage, hazards, and reconstruction needs.

Recommendation 4: Budget for the costs of communication and planning; revise budgets over time.

It is costly to produce communications media, provide technical advice to owners, and conduct community-level planning. Collecting data, providing constant communication with stakeholders, and implementing planning processes also require considerable financial resources. Budgets need to allocate funding for

- additional costs for information, data, communication, public involvement, and planning;
- revision over time because initial budgets will often need updating; and
- contingencies, because time compression creates a high probability of mistakes.

Indonesia's BRR invested in data collection and communication as critical parts of its recovery management. New Zealand's SCIRT is a flexible contracting arrangement that recognizes the uncertainties of speedy reconstruction and the frequent need to revise budgets. In India, the State of Gujarat paid for the comprehensive planning processes for reconstructing urban areas, which allowed the damaged urban centers to rebuild efficiently.

Recommendation 5: Increase capacity and empower local governments to implement recovery actions.

National governments are important sources of money, technical support, guidance, and oversight, but local governments are best suited to implement recovery and devise actions appropriate for their needs. Homeowners often require technical support to reconstruct their homes. Both India and Indonesia successfully helped homeowners rebuild. Indonesia's BRR empowered local government. In the United States, however, tensions continue among federal, state, and local governments, because local governments often resist federal restrictions.

Recommendation 6: Avoid permanent relocation of residents and communities except in rare instances, and only with full participation of residents.

Numerous scholars have documented the challenges of community relocations. Residents are attached to their homes and relocation disrupts their social and economic networks. Furthermore, relocation can impede access to residents' jobs. The cases in this report provide evidence of the difficulties and shortcomings of relocation: controversy over relocations after the Latur earthquake in Maharashtra; difficulty in developing new livelihoods for households displaced by the eruption of Indonesia's Mount Merapi; and buying out earthquake-damaged lands and rebuilding central Christchurch.

If the existing site is unsafe or does not provide access to livelihoods and services, relocation of homes and communities may be necessary. If the cost of in-situ reconstruction is too high or the challenge is too daunting, relocation programs must be voluntary and residents should fully participate in the process.

Recommendation 7: Reconstruct quickly, but do not rush.

Many governments and stakeholders assume that it is important to rebuild as many houses as quickly as possible. The number of housing units, however, is a poor indicator of recovery success. It takes time to develop site layouts and interior designs that meet the needs of residents. Rebuilding too quickly can preclude effective resident involvement, which often leads to dissatisfaction.

China's reconstruction after the 2008 earthquake, for example, overemphasized the need for speedy reconstruction, ignoring many other social and economic concerns. Kobe also emphasized rapid reconstruction of many new housing units on land that was readily available, such as an old steel mill site, rather than building on sites that were accessible to social networks and existing transportation systems.

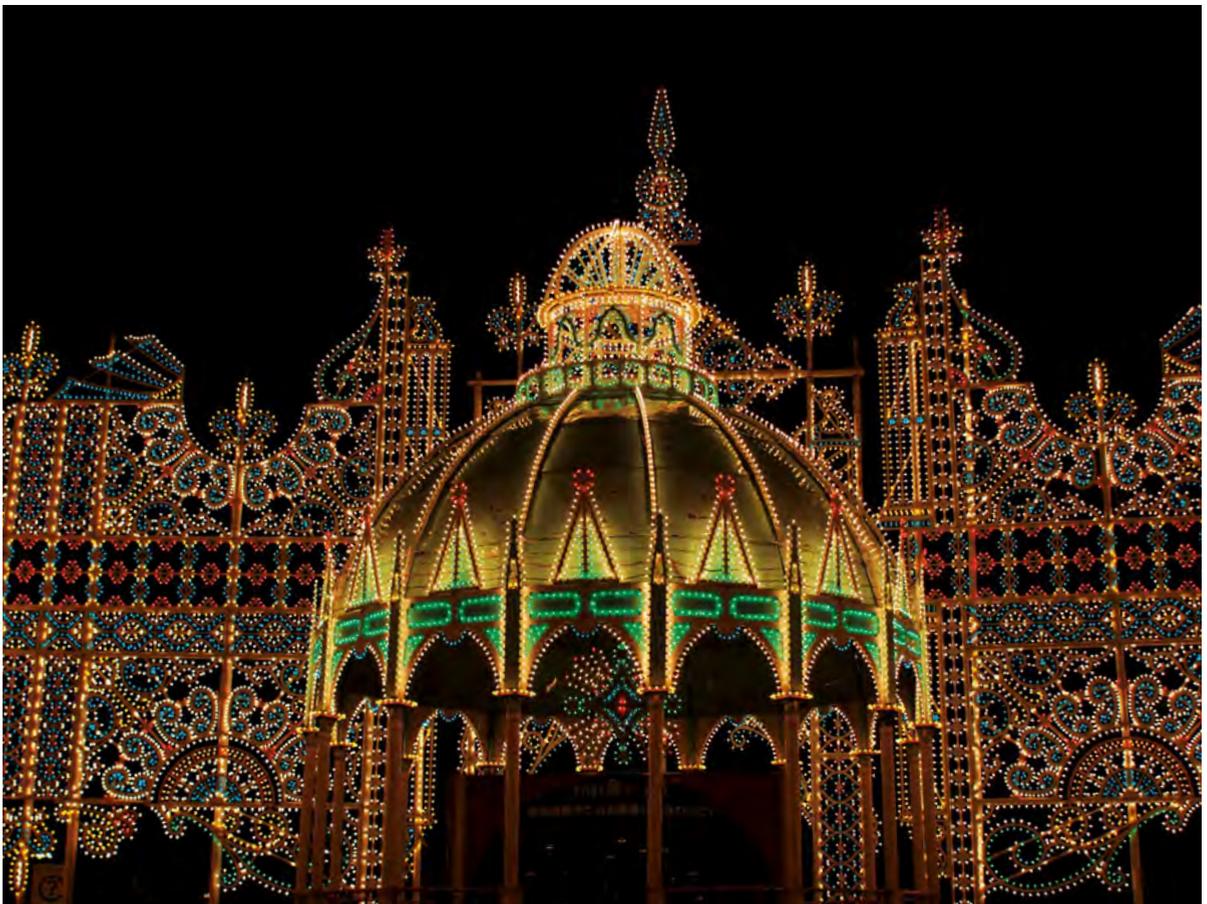
Conclusion

Large city disasters are becoming more common as the world rapidly urbanizes. Coastal areas are increasingly at risk because of the continuing growth of coastal populations and the effects of climate change. Yet disasters can provide opportunities for long-term betterment as money flows to devastated areas in the wake of large disasters.

Recovery is always complex, takes a very long time, and is never fast enough for affected residents. However, the process can be improved in several ways, including setting more realistic expectations at the outset, working to restore communities and economies quickly and equitably, empowering all stakeholders to participate in the process, ensuring governance for recovery over the long-term, and reducing the risk of future disasters.

A foresighted community thinks about the recovery process before the next disaster and discovers actions to reduce risk or at least to ease the recovery process. Planning ahead of time improves community resilience—the ability of the community to survive, adapt, and recover.

Ideally, a post-disaster recovery plan will always be part of an emergency management organization or development framework. Recovery plans should be structured to anticipate the next disaster and the following one, so that every community is ready to adapt and survive when the inevitable occurs.



The Kobe Luminaria, a massive light installation held every year since the earthquake in 1995, celebrates community recovery from the devastation. *Source: L. Johnson (2013).*

References

- Abhiyan and UNDP (United Nations Development Programme). 2001. "Coming Together: A Brief Document on the Post-Earthquake Rehabilitation Efforts by Various NGOs Working in Kutch." Bhuj, India: Kutch Nav Nirman Abhiyan.
- Abramson, Daniel, and Yu Qi. 2011. "'Urban-Rural Integration' in the Earthquake Zone: Sichuan's Post-Disaster Reconstruction and the Expansion of the Chengdu Metropole." *Pacific Affairs* 84 (3): 495–523.
- Alesch, Daniel J., Lucy A. Arendt, and James N. Holly. 2009. *Managing for Long-Term Community Recovery in the Aftermath of Disaster*. Fairfax, VA: Public Entity Risk Institute.
- Balachandran, B. 2010. "Planning the Reconstruction of Bhuj." In *Recovering from Earthquakes: Response, Reconstruction, and Impact Mitigation in India*, ed. S. Patel and A. Revi. New Delhi: Routledge.
- Bappenas, Governments of Yogyakarta, Governments of Central Java, and International Partners. 2006. "Preliminary Damage and Loss Assessment, Yogyakarta and Central Java Natural Disaster." Jakarta, Indonesia. http://siteresources.worldbank.org/INTINDONESIA/Resources/226271-1150196584718/PackagJune13_HIRES_FINAL.pdf.
- Barenstein, Jennifer D. 2006. "Housing Reconstruction in Post-Earthquake Gujarat: A Comparative Analysis" Humanitarian Practice Network. <http://odihpn.org/resources/housing-reconstruction-in-post-earthquake-gujarat-a-comparative-analysis/>.
- Bearak, Barry. 2005. "The Day the Sea Came." *New York Times*, November 27. <http://query.nytimes.com/gst/fullpage.html?res=9D01E2D71F3EF934A15752C1A9639C8B63&pagewanted=all.com>.
- Brownlee, Gerry. 2010a. "One-stop shop for major repair claims." <http://beehive.govt.nz/release/one-stop-shop-major-repair-claims>.
- . 2010b. "Government welcomes positive outlook for Canterbury." <http://beehive.govt.nz/release/govt-welcomes-positive-outlook-canterbury>.
- BRR (*Badan Rehabilitasi dan Rekonstruksi* [Rehabilitation and Reconstruction Agency]). 2005. "Aceh and Nias One Year After the Tsunami: The Recovery Effort and Way Forward." Banda Aceh, Indonesia: BRR and International Partners. http://siteresources.worldbank.org/INTEASTASIAPACIFIC/Resources/1YR_tsunami_advance_release.pdf.
- . 2009a. "Housing: Roofing the Pillars of Hope." Banda Aceh, Indonesia. www.recoveryplatform.org/assets/publication/BRR%20Book%20Series%20-%20Book%207%20-%20Housing.pdf.
- . 2009b. "10 Management Lessons for Host Governments Coordinating Post-Disaster Reconstruction." Banda Aceh, Indonesia. www.recoveryplatform.org/assets/publication/BRR%2010%20Management%20Lessons%20for%20Host%20Governments.pdf.
- CCDU (Christchurch Central Development Unit). 2012. Christchurch Central Recovery Plan: Te Mahere "Maraka Ōtautahi." CERA and Christchurch City Council. <https://ccdu.govt.nz/the-plan/christchurch-central-recovery-plan>.
- Central Disaster Management Council. 2011. "Report of the Committee for Technical Investigation on Countermeasures for Earthquakes and Tsunamis Based on the Lessons Learned from the '2011 off the Pacific Coast of Tohoku Earthquake.'" Tokyo, Japan: Cabinet Office of Japan.
- CERA (Canterbury Earthquake Recovery Authority). 2012. "Recovery Strategy for Greater Christchurch: Mahere Haumanutanga o Waitaha." <http://cera.govt.nz/recovery-strategy/overview/read-the-recovery-strategy/table-of-contents>.
- . 2013. "Public Sector Relocating to Christchurch CBD in 2016." <http://cera.govt.nz/news/2013/public-sector-relocating-to-christchurch-cbd-in-2016-10-september-2013>.
- . 2014. "CBD Rebuild Zone." <http://cera.govt.nz/cbd-rebuild-zone>.
- Chandrasekhar, Divya, Yang Zhang, and Yu Xiao. 2014. "Nontraditional Participation in Disaster Recovery Planning: Cases From China, India, and the United States." *Journal of the American Planning Association* 80 (4): 373–384.
- Chang, Stephanie E., Josh E. Taylor, Kenneth J. Elwood, Erica Seville, Dave Brunson, and Mikael Gartner. 2014. "Urban Disaster Recovery in Christchurch: The Central Business District Cordon and Other Critical Decisions." *Earthquake Spectra* 30 (1): 512–532. doi:<http://dx.doi.org/10.1193/022413EQS050M>.
- China Daily*. 2008. "Real challenges for rebuilding quake zone." August 19, 2008. www.chinadaily.com.cn/bizchina/2008-08/19/content_6949547.htm.

- Christchurch City Council. 2011. Central City Plan: Draft Central City Recovery Plan for Ministerial Approval. *resources*. <http://ccc.govt.nz/files/CentralCityDecember2011/FinalDraftPlan/FinaldraftCentralCityPlan.pdf>.
- City of Kobe. 1995. *Kobe City Restoration Plan*. Abridged Version.
- . 2010. "Comprehensive Strategy for Recovery from the Great Hanshin-Awaji Earthquake." www.city.kobe.lg.jp/safety/hanshinawaji/revival/promote/img/English.pdf.
- . 2012. "The Great Hanshin-Awaji Earthquake Statistics and Restoration Progress." www.city.kobe.lg.jp/safety/hanshinawaji/revival/promote/january.2012.pdf.
- City of New Orleans. 2008. "2009 Annual Budget." www.cityofno.com/Resources/2008mayorsbudget.pdf.
- City of New York. 2013. "A Stronger, More Resilient New York." www.nyc.gov/html/sirr/html/report/report.shtml.
- Cuomo, Andrew. 2013. "Governor Cuomo Designates 102 New York Rising Communities Eligible to Receive More Than \$750 Million for Storm Reconstruction." Press Release. July 18. www.governor.ny.gov/news/governor-cuomo-designates-102-new-york-rising-communities-eligible-receive-more-750-million.
- Earthquake Engineering Research Institute. 2008. "Learning from Earthquakes: The Wenchuan, Sichuan Province, China Earthquake of May 12, 2008." Oakland, CA. https://www.eeri.org/site/images/eeri_newsletter/2008_pdf/Wenchuan_China_Recon_Rpt.pdf.
- Edgington, David. 2010. *Reconstructing Kobe: The Geography of Crisis and Opportunity*. Vancouver, British Columbia: UBC Press.
- English, Bill. 2014. "Rebuilding Christchurch." Wellington, NZ. 2014 budget speech. www.treasury.govt.nz/budget/2014/speech/06.htm.
- EQC (New Zealand Earthquake Commission). 2015. "Scorecard, Progress and Updates, Canterbury Earthquakes." www.eqc.govt.nz/canterbury-earthquakes/progress-updates/scorecard.
- Evans, Neil. 2001. "Community Planning in Japan: The Case of Mano, and Its Experience in the Hanshin Earthquake." Doctoral thesis, School of East Asian Studies, University of Sheffield.
- FEMA (Federal Emergency Management Agency). 2011. "Lessons in Community Recovery: Seven Years of Emergency Support Function #14 Long-Term Community Recovery From 2004 to 2011." Washington, DC. www.fema.gov/pdf/rebuild/ltrc/2011_report.pdf.
- . 2013. "Louisiana Recovery Office | FEMA.gov." Washington, DC. www.fema.gov/news-release/2013/08/28/louisiana-recovery-eight-years-after-hurricanes- Katrina-and-rita.
- . 2014. "Mississippi Recovery Office | FEMA.gov." Washington, DC. <https://www.fema.gov/mississippi-recovery-office>.
- Fugate, Craig. 2012. "Written Testimony of FEMA Administrator for a Senate Committee on Appropriations, Subcommittee on Homeland Security Field Hearing Titled 'Hurricane Isaac—Assessing Preparedness, Response, and Recovery Efforts.'" U.S. Department of Homeland Security. www.dhs.gov/news/2012/09/25/written-testimony-fema-administrator-senate-committee-appropriations-subcommittee.
- GAO (Government Accountability Office). 2007. "Gulf Coast Rebuilding: Observations on Federal Financial Implications, Testimony Before the Committee on the Budget, U.S. House of Representatives." GAO-07-1079T. Washington, DC. www.gao.gov/new.items/d071079t.pdf.
- . 2009. "Gulf Coast Disaster Recovery: Community Development Block Grant Program Guidance to States Needs to Be Improved." GAO-09-541. Washington, DC. www.gao.gov/assets/300/291291.pdf.
- GOSR (Governor's Office of Storm Recovery). 2015. "Funding Portal | New York Storm Recovery Resources Center." New York State. www.stormrecovery.ny.gov/funding/funding-portal.
- Green, Timothy F., and Robert B. Olshansky. 2012. "Rebuilding Housing in New Orleans: The Road Home Program after the Hurricane Katrina Disaster." *Housing Policy Debate* 22 (1): 75–99.
- GSDMA (Gujarat State Disaster Management Authority). n.d. *Kutch Rehabilitation After the Earthquake: Story of Human Resilience and Endeavour*. Gandhinagar, India. www.gsdma.org/key-projects-programmes/geerp-gerrp.aspx.
- . 2006. "Gujarat Emergency Earthquake Reconstruction Project, Quarterly Progress Report, World Bank, January–March 2006." Gujarat State Disaster Management Authority. Gandhinagar, India. www.gsdma.org/key-projects-programmes/geerp-gerrp.aspx.

- Gupta, L. C., M. C. Gupta, Anil Sinha, and Vinod K. Sharma. 2002. *Gujarat Earthquake, 26th January, 2001*. New Delhi: Indian Institute of Public Administration, National Center for Disaster Management.
- Haas, J. Eugene, Robert Kates, and Martyn Bowden, eds. 1977. *Reconstruction Following Disaster*. Cambridge, MA: MIT Press.
- HUD (U.S. Department of Housing and Urban Development). 2014. "CDBG-DR Active Disaster Grants and Grantee Contact Information." HUD Exchange. <https://www.hudexchange.info/cdbg-dr/cdbg-dr-grantee-contact-information/>.
- Hurricane Sandy Rebuilding Task Force. 2013. "Hurricane Sandy Rebuilding Strategy: Stronger Communities, A Resilient Region." Washington DC: U.S. Department of Housing and Urban Development. http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2013/HUDNo.13-125.
- Hyogo Prefecture. 1999. "Damage Caused by the Great Hanshin-Awaji Earthquake and the Current Status of the Reconstruction." 1999 Consular Summit, March 8, 1999. Kobe, Japan: Hyogo Prefectural Government.
- Innes, Judith E., and David E. Booher. 2010. *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. New York: Routledge.
- International Recovery Platform. 2009. "The Yogyakarta and Central Java Earthquake 2006." Kobe, Japan. www.recoveryplatform.org/assets/publication/RecoveryStatusReport/RECOVERY%20STATUS%20REPORT%20YOGYAKARTA%202009-1.pdf.
- Ito, Zenichi. 2004. "Reconstruction Organizations." In *Assessment Reports of the Global Assessment of Earthquake Countermeasures*. Kobe, Japan: Hyogo Prefectural Government.
- Iuchi, Kanako, Elizabeth Maly, and Laurie Johnson. 2015. "Three Years after a Mega-Disaster: Recovery Policies, Programs and Implementation after the Great East Japan Earthquake." In *Post-Tsunami Hazard Reconstruction and Restoration*. Ed. Vincente Santiago-Fandiño, Yevgeniy Kontar, and Yoshiyuki Kaneda. New York: Springer.
- Iuchi, Kanako, Laurie A. Johnson, and Robert B. Olshansky. 2013. "Securing Tohoku's Future: Planning for Rebuilding in the First Year Following the Tohoku-Oki Earthquake and Tsunami." *Earthquake Spectra* 29 (S1): S479–499. doi:<http://dx.doi.org/10.1193/1.4000119>.
- Japan Cabinet Office. 2012. "Recent Status on Disaster of Extreme Severity." Government of Japan.
- Japan Ministry of Construction, City Bureau. 2000. *Urban Development Project in Japan, Third Edition*. City Bureau, Ministry of Construction, Japan Land Readjustment Association.
- Japan Society of Civil Engineers (JSCE). 2011. Documents on reporting from Tsunami Theme Committee No. 3. September 14. <http://committees.jsce.or.jp/2011quake/node/96>.
- Java Reconstruction Fund. 2012. Java Reconstruction Fund Website, October 22, 2012. Jakarta: World Bank. www.javareconstructionfund.org/index.php.
- Johnson, Laurie A., and Ljubica Mamula-Seadon. 2014. "Transforming Governance: How National Policies and Organizations for Managing Disaster Recovery Evolved Following the 4 September 2010 and 22 February 2011 Canterbury Earthquakes." *Earthquake Spectra* 30 (1): 557–605. doi:<http://dx.doi.org/10.1193/032513EQS078M>.
- Kanamori, Hiroo. 2006. "Seismological Aspects of the December 2004 Great Sumatra-Andaman Earthquake." *Earthquake Spectra* 22 (S3): S1-S12.
- Kates, R. W., C. E. Colten, S. Laska, and S. P. Leatherman. 2006. "Reconstruction of New Orleans after Hurricane Katrina: A Research Perspective — PNAS." *Proceedings, National Academy of Sciences* 103 (40): 14653–14660.
- Katz, Bruce. 2014. "How Washington Made Itself Irrelevant | Brookings Institution." *The Washington Post*, Opinion, December 5. www.brookings.edu/research/opinions/2014/12/05-washington-irrelevant-katz.
- Key, John, and Gerry Brownlee. 2011. "Earthquake Recovery Options." June 23. <http://beehive.govt.nz/release/video-prime-minister-john-key-and-earthquake-recovery-minister-gerry-brownlee-earthquake-rec>.
- King, Rawle O. 2013. "The National Flood Insurance Program: Status and Remaining Issues for Congress." CRS Report for Congress R42850. Washington, DC: Congressional Research Service. <https://www.fas.org/sgp/crs/misc/R42850.pdf>.
- Kingsbury, Damien. 2007. "The Free Aceh Movement: Islam and Democratisation." *Journal of Contemporary Asia* 37 (2): 166–189.

- Law, Tina. 2015. "Extra Money for Christchurch Rebuild." *The Press*, May 22. www.stuff.co.nz/the-press/news/68750077/extra-money-for-christchurch-rebuild.
- Lochhead, Helen. 2014. "Winning Strategies for Climate Resilience: Helen Lochhead Considers Rebuild by Design." *Land Lines*. July.
- LRA (Louisiana Recovery Authority). 2007. "Louisiana Speaks Regional Plan: Visions and Strategies for Recovery and Growth in South Louisiana." <http://lra.louisiana.gov/index.cfm?md=subsite&tmp=home&ssid=1>.
- . 2010. "Louisiana Recovery Authority, 2005–2010." <http://lra.louisiana.gov/assets/docs/searchable/Quarterly%20Reports/FinalReportJune2010.pdf>.
- Mammen, David. 2011. *Creating Recovery: Values and Approaches in New York After 9/11*. Japan: Fuji Technology Press, Ltd.
- Martin, Carlos. 2015. "Rebuild by Design: Lessons Learned from the Evaluation of HUD's Post-Sandy Resilience Design Competition." *Natural Hazards Observer*. January.
- McDonald, Liz. 2015. "Christchurch's CBD Expected to Add 8000 New Workers in Next 2 Years." *The Press*, May 1. www.stuff.co.nz/business/industries/67533851/Christchurchs-CBD-expected-to-add-8000-new-workers-in-next-2-years/the-press/news/68489590/canterbury-house-prices-hit-a-high.
- Mississippi Development Authority. 2014. "Lesson Learned from Katrina Recovery." Disaster Recovery Division, Mississippi Development Authority. www.msdisasterrecovery.com/index.php/22-news/featured/139-housing-director-gerald-blessey.
- Mitsui, Yasuhisa. 2014. Former Secretary of the National Land Agency. Interview by Laurie A. Johnson. Trans. Norio Maki. October 28.
- MLIT (Ministry of Land Infrastructure, Transport, and Tourism). 2011. "Current Situation of Coastal Levee Heights in the Three Affected Prefectures." Tokyo: Government of Japan.
- Multi-Donor Fund for Aceh and Nias, and Java Reconstruction Fund. 2012. "Rekompak: Rebuilding Indonesia's Communities After Disasters." Jakarta, Indonesia: World Bank. <http://documents.worldbank.org/curated/en/2012/10/18781677/rekompak-rebuilding-indonesias-communities-after-disasters>.
- Murdoch, Simon. 2014. "Annual Review of the Canterbury Earthquake Recovery Act 2011." <http://cera.govt.nz/sites/default/files/common/canterbury-earthquake-recovery-act-2011-annual-review-2014.pdf>.
- Murty, C. V. R., Marjorie Greene, Sudhir K. Jain, N. Purendra Prasad, and Vipul V. Mehta. 2005. "Earthquake Rebuilding in Gujarat, India." Oakland, California: Earthquake Engineering Research Institute.
- National Library of New Zealand. 2011. "Canterbury Earthquake Recovery Commission." *NLNZ Web Archive Viewer*. <http://ndhadeliver.natlib.govt.nz/ArcAggregator/arcView/frameView/IE4331348/http://www.cerc.govt.nz/>.
- Nemoto, Takumi. 2014. "For Accelerating the Reconstruction from the Great East Japan Earthquake." Reconstruction Agency, Government of Japan. www.reconstruction.go.jp/rap/2014/02/20140224_fpc.pdf.
- New Jersey, Department of Community Affairs. 2015. "Superstorm Sandy Community Development Block Grant - Disaster Recovery, Amendment Number 11, Substantial Amendment for the Third Allocation of CDBG-DR Funds." www.renewjerseystronger.org/wp-content/uploads/2015/04/APA-11-Non-RBD-Amendment-w-Comments-and-Responses-4-22-15.pdf.
- New Zealand Parliament. 2011. Canterbury Earthquake Recovery Act 2011. www.legislation.govt.nz/act/public/2011/0012/latest/DLM3653522.html.
- NYC Recovery (City of New York). 2015. "NYC Sandy Funding Tracker." www1.nyc.gov/sandytracker/.
- NYCEDC (New York City Economic Development Corporation). 2014. "The Rebirth of Lower Manhattan." November 4. www.nycedc.com/blog-entry/rebirth-lower-manhattan.
- NYCIBO (New York City Independent Budget Office). 2011. "The Aftermath: Federal Aid 10 Years After the World Trade Center Attack." Fiscal Brief. New York, NY: New York City Independent Budget Office. www.ibo.nyc.ny.us/iboreports/wtc2011.pdf.
- NZ HRC (New Zealand Human Rights Commission). 2013. "Monitoring Human Rights in the Canterbury Earthquake Recovery." www.hrc.co.nz/files/2114/2427/8929/HRC-Earthquake-Report-2013-final-for-web.pdf.

- Okamoto, Masakatsu. 2014. Director-General for Reconstruction Policy, Japan National Reconstruction Agency. Interview by Laurie A. Johnson. Trans. Norio Maki. October 29.
- Olshansky, Robert B., Lewis D. Hopkins, and Laurie A. Johnson. 2012. "Disaster and Recovery: Processes Compressed in Time." *Natural Hazards Review* 13 (3): 173–178. doi:10.1061/(ASCE)NH.1527-6996.0000077.
- Olshansky, Robert B., and Laurie A. Johnson. 2010. *Clear as Mud: Planning for the Rebuilding of New Orleans*. Chicago, IL and Washington DC: American Planning Association.
- Painter, William L., and Jared T. Brown. 2013. "Analysis of the Sandy Recovery Improvement Act of 2013." CRS Report for Congress R42869. Washington, DC: Congressional Research Service. <https://www.fas.org/sgp/crs/misc/R42869.pdf>.
- Peng, Yi, Liyin Shen, Cong Tan, Dalu Tan, and Hao Wang. 2013. "Critical Determinant Factors (CDFs) for Developing Concentrated Rural Settlement in Post-Disaster Reconstruction: A China Study." *Natural Hazards* 66: 355–373.
- QV.co.nz. 2015. "Residential House Price Index." QV.co.nz. <http://www.qv.co.nz/resources/residential-house-price-index>.
- Reconstruction Agency, Government of Japan. 2013a. "About Future Reconstruction Programs and Funding Sources." www.reconstruction.go.jp/topics/20130207_shiryuu01.pdf.
- . 2013b. "Current Status and Path Toward Reconstruction." www.reconstruction.go.jp/english/topics/2013/03/about-us-situation-overview.html.
- . 2015. "Situation Overview: Scope of Damages." www.reconstruction.go.jp/english/topics/2013/03/about-us-situation-overview.html.
- Reconstruction Design Council. 2011. "Towards Reconstruction: Hope beyond the Disaster." Report to the Prime Minister, in response to the Great East Japan Earthquake. www.mofa.go.jp/announce/jfpu/2011/7/pdfs/0712.pdf.
- Republic of Indonesia. 2005. "Master Plan for the Rehabilitation and Reconstruction of the Regions and Communities of the Province of Nanggroe Aceh Darussalam and the Islands of Nias, Province of North Sumatera."
- Rose, Adam, Gbadebo Oladosu, Bumsoo Lee, and Garrett Beeler Asay. 2009. "The Economic Impacts of the September 11, 2001 Terrorist Attacks: A Computable General Equilibrium Analysis." *Peace Economics, Peace Science and Public Policy* 15 (2, Article 4): 1–28.
- Rosen, Christine M. 1986. *The Limits of Power: Great Fires and the Process of City Growth in America*. Cambridge: Cambridge University Press.
- Rubin, Claire. 1985. *Community Recovery from a Major Natural Disaster*. Monograph No. 41. Boulder, Colorado: Program on Environment and Behavior, Institute of Behavioral Science, University of Colorado.
- . 2012. *Emergency Management: The American Experience 1900–2010*. 2nd ed. Boca Raton, FL: CRC Press.
- Saito, Tomio. 1999. Director of Readjustment Area Improvement, Hyogo Prefecture. Interview by Robert B. Olshansky, Laurie A. Johnson, and Kenneth C. Topping. July 9.
- Small, Vernon, and Cecile Meier. 2015. "EQC on Solid Ground - Review." *The Press*. February 5, National edition. www.stuff.co.nz/national/65799249/eqc-on-solid-ground--review.
- Smith, Gavin. 2011. *Planning for Post-Disaster Recovery: A Review of the United States Disaster Assistance Framework*. Alexandria, VA: Public Entity Risk Institute.
- Smith, Gavin, and Thomas Birkland. 2012. "Building a Theory of Recovery: Institutional Dimensions." *International Journal of Mass Emergencies and Disasters: Special Issue on Theory of Disaster Recovery* 30 (2): 147–170.
- Sorace, Christian, and William Hurst. 2015. "China's Phantom Urbanisation and the Pathology of Ghost Cities." *Journal of Contemporary Asia* 46 (2): 304–322.
- Sorensen, Andre. 2002. *The Making of Urban Japan: Cities and Planning from Edo to the Twenty First Century*. Japanese Studies. New York: Routledge.
- Spangle Associates. 1997. *Evaluation of Use of the Los Angeles Recovery and Reconstruction Plan After the Northridge Earthquake*. Portola Valley, CA: Spangle Associates.

- State Council of the People's Republic of China. 2008a. *Regulation on Restoration and Reconstruction in Wenchuan Earthquake Hit Regions*. Beijing. June 8.
- . 2008b. *The Overall Planning for Post-Wenchuan Earthquake Restoration and Reconstruction*. Beijing. September 19. <http://en.ndrc.gov.cn/policyrelease/200810/P020081010622006749250.pdf>.
- Thiruppugazh, V. 2007. "Post-Disaster Reconstruction and the Window of Opportunity." Paper presented at Democracy, Development and Civil Society in India, Melbourne, Australia (September 20–21).
- Thiruppugazh, V., and Sudhir Kumar. 2010. "Lessons from the Gujarat Experience for Disaster Mitigation and Management." In *Recovering from Earthquakes: Response, Reconstruction, and Impact Mitigation in India*, ed. S. B. Patel and A. Revi, 223–237. New Delhi: Routledge.
- Tokyo Metropolitan Office. 1933. *The Reconstruction of Tokyo*. Tokyo, Japan: Kawaguchi Printing Works.
- Ubaura, Michio. 2015. "Reconstruction Plans and Planning Process after the Great East Japan Earthquake and Tsunami." In *Post-Tsunami Hazard: Reconstruction and Restoration*, 15–28. Ed. Vicente Santiago-Fandiño, Yevgeniy Kontar, and Yoshiyuki Kaneda. New York: Springer.
- UNDP (United Nations Development Programme) and BNPB (*Badan Nasional Penanggulangan Bencana* [National Disaster Management Agency]). 2009. "Lessons Learned: Disaster Management Legal Reform, the Indonesian Experience." Jakarta, Indonesia. www.alnap.org/resource/10169.
- U.S. Agency for International Development. 2005. "Indian Ocean – Earthquakes and Tsunamis, Fact Sheet #39." July 7. http://transition.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/countries/indian_ocean/template/fs_sr/indianocean_et_fs39_07-07-2005.pdf.
- Valverde, L. James, and Robert P. Hartwig. 2006. "9/11 and Insurance: The Five Year Anniversary." New York, NY: Insurance Information Institute. www.iii.org/sites/default/files/docs/pdf/September%2011%20Anniversary.pdf.
- White House, U.S. Office of the President. 2012. "Executive Order: Establishing the Hurricane Sandy Rebuilding Task Force." www.whitehouse.gov/the-press-office/2012/12/07/executive-order-establishing-hurricane-sandy-rebuilding-task-force.
- World Bank. 2005. *Rebuilding a Better Aceh and Nias: Stocktaking of the Reconstruction Efforts*. Washington, DC. <http://documents.worldbank.org/curated/en/2005/10/6404968/rebuilding-better-aceh-nias-stocktaking-reconstruction-efforts>.
- . 2009. "Implementation Completion and Results Report (IDA-36370) on a Credit in the Amount of SDR 356.0 Million (US\$442.8 Million Equivalent) to the Republic of India for a Gujarat Emergency Earthquake Reconstruction Project." Washington, DC. www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/06/08/000333038_20090608014529/Rendered/PDF/ICR6380P0740181010official0Use0Only1.pdf.
- WTC (World Trade Center). 2015. "News—World Trade Center." www.wtc.com/news/.
- Xiao, Yu, Yang Zhang, Laurie Johnson, Robert Olshansky, and Yan Song. 2015. "Financing Rapid Community Reconstruction after Catastrophic Disaster: Lessons from the 2008 Wenchuan Earthquake in China." Department of Landscape Architecture and Urban Planning, Texas A&M University.
- Xinhua News Agency. 2008. "China View: China Quake Death Toll Remains Unchanged at 69,226." August 25, 2008. http://news.xinhuanet.com/english/2008-08/25/content_9708034.htm.
- Yong, Chen, and David C. Booth. 2011. *The Wenchuan Earthquake of 2008: Anatomy of a Disaster*. Beijing and Berlin: Science Press and Springer-Verlag.

Acknowledgments

This report covers two decades of research in six different countries, which involved collecting hundreds of documents and interviewing countless government officials, academic researchers, representatives of international aid organizations, community leaders, and disaster survivors. We are deeply indebted to all these people who shared their valuable time with us, often while facing the stresses of post-disaster recovery. In each country, a few key people were instrumental in organizing our visits and providing us with access to key informants, and we would like to recognize them here:

Zhou Bo (Sichuan University), Braven Zhang (Beijing Normal University), our Wenchuan Earthquake research team of Yu Xiao (Texas A&M), Yang Zhang (Virginia Tech), and Yan Song (University of North Carolina), Ljubica Mamula Seadon (formerly MCDEM), Tim Howe (Ocean Partners), Tom O'Rourke (Cornell University), Lianne Dalziel and Carolyn Ingles (City of Christchurch), Michael Theelan (formerly City of Christchurch), Nick Rogers (Tonkin and Taylor), Rod Cameron (Stronger Christchurch Infrastructure Rebuild Team), Simon Markham (Waimakariri District Council), Benesia Smith (CERA), Haruo Hayashi and Norio Maki (Kyoto University), Kanako Iuchi (Tohoku University), Yoshimi Amakawa (Kinmokusei/Co-Plan), Ikuo Kobayashi (Kobe Yamate University), Kazuyoshi Ohnishi (Kobe University), Toshikazu Ota (City of Kobe), Pungky Sumadi (Bappenas), Togu Pardede (Bappenas), Suprayoga Hadi (Bappenas), Venkatachalam Thiruppugazh (GSDMA), B. R. Balachandran (formerly of Environmental Planning Collaborative), Saket Sarraf (CEPT University), David Mammen (formerly of Institute of Public Administration), Ken Topping (California Polytechnic State University), Jeffrey Hebert (City of New Orleans), Dina Long (Borough of Sea Bright, New Jersey), Matt Campbell (Federal Emergency Management Agency), and Scott Davis (U.S. Department of Housing and Urban Development).

This material is based on work supported by numerous sources, including the National Science Foundation (under Grant Nos. CMMI 1030332, 0758310, and 9730137), the Mid-America Earthquake Center, the Public Entity Risk Institute (PERI), the Research Board of the University of Illinois at Urbana–Champaign, the City of Christchurch and Canterbury Earthquake Recovery Authority, the Borough of Sea Bright New Jersey, the Center for Global Partnership of the Japan Foundation, and Kyoto University Disaster Prevention Research Institute. Finally, we are very grateful for the funding and support of the Lincoln Institute of Land Policy and want to especially thank our program director, Armando Carbonell, and our editor, Emily McKeigue, for their perseverance in seeing this project through to completion and publication.

ABOUT THE AUTHORS

Laurie A. Johnson, Ph.D., AICP, is an internationally recognized urban planner specializing in disaster recovery and catastrophe risk management. She has an extensive portfolio of disaster recovery expertise following earthquakes, landslides, floods, hurricanes, and man-made disasters across the United States and the world. In 2006, she was a lead author of the recovery plan for the City of New Orleans following Hurricane Katrina; she then coauthored the book *Clear as Mud: Planning for the Rebuilding of New Orleans* with Robert Olshansky. She is a lead author of the American Planning Association's guidebook *Planning for Post-Disaster Recovery: Next Generation* (2014). She is also a visiting project scientist at the Pacific Earthquake Engineering Center at the University of California, Berkeley. Her consultancy is based in San Rafael, California.

Robert B. Olshansky, Ph.D., FAICP, is professor and head of the department of Urban and Regional Planning, University of Illinois at Urbana–Champaign, where he has taught for more than 26 years. He has published extensively on post-disaster recovery planning, policy for earthquake risks, hillside planning and landslide policy, and environmental impact assessment. He coauthored *Clear as Mud: Planning for the Rebuilding of New Orleans* with Laurie Johnson, as well as the report *Opportunity in Chaos: Rebuilding after the 1994 Northridge and 1995 Kobe Earthquakes* with Laurie Johnson and Ken Topping. He and collaborators, with support from the National Science Foundation and University of Illinois, also researched and published on disaster recovery in China, India, Indonesia, Haiti, and Japan.

ABOUT THE LINCOLN INSTITUTE OF LAND POLICY

www.lincolninst.edu

The Lincoln Institute of Land Policy is the leading resource for key issues concerning the use, regulation, and taxation of land. Providing high-quality education and research, the Institute strives to improve public dialogue and decisions about land policy. As a private operating foundation whose origins date to 1946, the Institute seeks to inform decision making through education, research, policy evaluation, demonstration projects, and the dissemination of information, policy analysis, and data through our publications, website, and other media. By bringing together scholars, practitioners, public officials, policy makers, journalists, and involved citizens, the Lincoln Institute integrates theory and practice, and provides a nonpartisan forum for multidisciplinary perspectives on public policy concerning land, both in the United States and internationally.

Ordering Information

To download a free copy of this report or to order copies, visit www.lincolninst.edu and search by author or title. For additional information on discounted prices for bookstores, multiple-copy orders, and shipping and handling costs, send your inquiry to lincolnorders@pssc.com.

EDITOR & PROJECT MANAGER
Emily McKeigue

DESIGN & PRODUCTION
Sarah Rainwater Design

PRINTING
Recycled Paper Printing

Back Cover: This is an advertisement for the documentary film by Peter Young entitled *The Art of Recovery* about the post-earthquake art and hospitality scene in Christchurch, New Zealand. The sign is near the former site of Smash Palace, one of the first bars to open in the city's earthquake-damaged central business district. The documentary aired at the New Zealand International Film Festival in August 2015.
Source: *L. Johnson (2015)*.



LINCOLN INSTITUTE
OF LAND POLICY

113 Brattle Street, Cambridge, MA
02138-3400, USA

P (617) 661-3016 or (800) 526-3873

F (617) 661-7235 or (800) 526-3944

help@lincolninst.edu

lincolninst.edu



After Great Disasters

How Six Countries Managed Community Recovery

The aftermath of great natural disasters and the management of the recovery process have an enormous effect on the lives of citizens and can change the future of a city or region forever.

This report identifies lessons from six countries that have faced significant disaster recovery challenges and employed different management approaches: China, New Zealand, Japan, India, Indonesia, and the United States. Each of these governments withstood considerable uncertainty and had to balance the tensions between speed and deliberation, between restoration and betterment.

Through examining these case studies, the authors offer the following recovery recommendations that reflect a set of core principles: primacy of information, stakeholder involvement, and transparency.

- Enhance existing government systems and structures to promote information flow and collaboration.
- Emphasize data management, communication, transparency, and accountability.
- Plan and act simultaneously while monitoring, evaluating, and correcting.
- Budget for the costs of communication and planning.
- Increase capacity and empower local governments to implement recovery actions.
- Avoid permanent relocation of residents and communities except in rare instances when public safety and welfare are at risk, and only with full participation of residents.
- Reconstruct quickly, but do not rush.