Disaster Recovery and Community Renewal: Housing Approaches

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Abstract

How we understand and measure success in disaster recovery establishes the policy platform for how governments prepare for future events. In the past two decades, observers have recognized that the return to pre-event conditions is often unworkable—not only because the pre-event conditions were hazardous, but also because the disaster has created a new normal, requiring new ways of thinking and planning. Disaster recovery means more than restoring physical infrastructure and reconstructing housing and commercial buildings. Recovery is now linked to the concepts of resilience and community renewal, with social, economic, institutional, infrastructural, ecological, and community dimensions. Recent research has helped to identify the linkages among several factors: the welfare of individuals; the welfare of households; business and civic recovery; and the importance of health, education, housing, employment, and environmental conditions in recovery. The capacity for renewal, reorganization, and development is critical for ultimately going beyond recovery to community resilience. The range of approaches to the recovery process after recent earthquakes in Chile, China, Haiti, Italy, Japan, New Zealand, and other countries offers insights into successful policies and challenges to integrating housing and recovery at the human and civic levels.

Introduction

Jobs and housing are often cited as the key elements of disaster recovery. Individuals and communities struck by an earthquake, hurricane, or other calamity cannot "return to normal" unless people have means of supporting themselves and places to live. For residents and for the community as a whole, however, normalcy also requires that community services such as roads, bridges, and the utility infrastructure be functional; schools, health care, and social services be available; and banks, businesses, and governments be functioning. The way recovery is defined, the way it is financed, and the metrics used to evaluate its success or failure are critical to the kinds of assistance policies governments devise.

The concept of disaster resilience can be defined simply as the capacity to rebound from future disasters. Several efforts are under way in the United States and globally among researchers and policymakers to develop the means of measuring and monitoring community resilience. Although no single model can quantify disaster resilience, the growing consensus is that resilience is a multifaceted concept, with social, economic, institutional, infrastructural, ecological, and community dimensions (NRC, 2010; Peacock et al., 2008). Several sets of resilience indicators or attributes can serve as baselines for measuring recovery progress and outcomes after a disaster event (Bruneau et al., 2003; CARRI, 2009; Cutter, Burton, and Emrich, 2010; Miles and Chang, 2006; Norris et al., 2008; Twigg, 2009). Community functions such as infrastructure, housing, economic viability, and social conditions are typically listed as performance indicators. This excellent work on resilience has advanced understanding of the multifaceted components of recovery and provided metrics for measurement, but there is a need to translate academic concepts into programs to help people in affected communities and local governments and to redefine policies in agencies at the national government level.

Theory, unfortunately, is way ahead of practice. Even with the Federal Emergency Management Agency's (FEMA's) development of the National Disaster Recovery Framework, several problems make implementing forward-thinking ideas on resilience and recovery problematic.

1. **Lack of preparedness for recovery.** With the exception of a few cities in Japan and California, most jurisdictions and most individuals are not prepared for any major disaster or national emergency. Not only are individuals unprepared, communities are largely uninsured and have unrealistic expectations that government will make them whole. Jaffee and Russell (2013) identified four major trends in the economics of catastrophes since World War II: (a) the number and severity of catastrophic events is increasing; (b) insurance markets that cover these risks have steadily disappeared; (c) government relief has expanded significantly; and (d) public- and private-sector actions to mitigate risks, including avoiding development in risky areas and reinforcing structures, has been limited. Although many societies invest a great deal of effort in teaching the basics of emergency preparedness (such as "duck and cover"), those same societies have invested little in serious planning for recovery from disasters.

2. **Lack of local implementation capacity.** Like individuals, local governments are pushed beyond their capacities during and after a disaster. In normal times, cities collect taxes, manage traffic, repair potholes, and balance the concerns of residents and businesses. None have financial reserves for disasters. City government agencies know how to regulate for planning and building, but most do not have the staff to think in terms of redevelopment, economic development, or new housing models—all of which are critical after a disaster. City governments often lose their tax base after major disasters, and they struggle to provide basic services while attempting to negotiate national government funding and manage a recovery process for citizens and business.

3. **Lack of funding.** In the United States, the national government supports the restoration of highways and public infrastructure, but government funding to assist with housing—which typically represents 50 percent of the value of any disaster loss—is very limited. Funding is also lacking to support the human effort needed to implement a truly coordinated recovery effort. In both developed and developing countries, disaster recovery aid is often narrowly targeted toward building physical facilities, particularly infrastructure, without comprehensive housing, social, and economic development efforts.

4. **Antiquated and inflexible government programs.** Most countries that have disaster aid legislation will find that it is based on historic events that do not reflect current social or economic circumstances or levels of urbanization. In the United States, for one example among many, the Stafford Act[1] allows only for the federal government to provide "temporary housing." As a result, an idea such as the one for the Katrina Cottages—small starter homes designed in the wake of Hurricane Katrina in 2005 at a lower cost than temporary trailers—could not be funded under the Stafford Act. Although an Affordable Housing Pilot Program, or AHPP, responsive to the Katrina Cottages idea was implemented in different ways in four states after Hurricane Katrina, only a relatively small number were built, and the idea of cost-efficient and permanent government-funded housing would not be possible in the future without special congressional authorization.
5. **Poverty and dilapidated public institutions.** Whether in Haiti, Latin America, Africa, Asia, or parts of North America and Europe, health care, education, clean water and other basic public services are simply not accessible for the world's poor citizens. Disasters in these settings cause what Farmer (2011) calls "acute-on-chronic" problems that humanitarian aid cannot begin to resolve.

Recognizing the problems with disaster recovery implementation is a first step to thinking about how to operationalize resilience ideas. Scholars involved with resilience in relation to complex adaptive systems increasingly avoid the use of the term "recovery" and prefer the concepts "renewal," "regeneration," and "reorganization" (Bellwood et. al., 2004). If resilience is considered as an approach to disaster recovery, it can become a valuable tool for policies that support sustainable redevelopment.

Housing As a Core Element of Recovery and Renewal

Housing is a core element of daily life and a critical component of any disaster recovery effort. In most parts of the world, housing is privately owned and, as such, housing recovery is managed differently than recovery in the public sector (roads, schools, hospitals, and government and cultural facilities). Housing recovery, however, is critically interdependent with recovery of those public-sector facilities. Until the 1970s, no U.S. disaster assistance policies provided any funding for housing recovery. Later, small programs were designed to assist homeowners with Small Business Administration (SBA) loans and modest FEMA grants for limited repairs, but national policies assume that private funds, insurance, or both will be used for housing repair (Comerio, 1998). In the United States, limited U.S. Department of Housing and Urban Development involvement in public housing repairs and block grants for rental housing repairs are insufficient to meet the needs in contemporary society.

In the United States, policymakers assume that the private property market will adapt in post-disaster situations. Economic conditions since the financial crisis of 2008, however, suggest that markets alone would not be able to solve postdisaster housing reconstruction. The nation now has 10.8 million homeowners (heavily concentrated in disaster-prone regions such as California and Florida) whose home value is less than their mortgage (Zillow, 2013). These homeowners are

[1] *Robert T. Stafford Disaster Relief and Emergency Assistance Act*. Public Law 93-288.

not likely to have disaster insurance—only 11 percent of California homeowners have earthquake insurance (Jones, 2014)—and, should a disaster occur, they would not qualify for SBA loans. Typical FEMA individual assistance programs would not cover their repair costs. Without assistance, would homeowners abandon their homes? Where would they go?

U.S. policies furthermore assume that renters can find alternate rentals, but, in what has become a highly urbanized society, multifamily losses will leave many renters homeless while building owners make investment decisions that may not include replacement housing. In the San Francisco Bay Area, after the 1989 Loma Prieta earthquake, it took 10 years to replace 75 percent of the affordable housing lost. It took 4 years to rebuild middle-class apartments lost in Los Angeles after the 1994 Northridge earthquake, and it took 7 to 10 years to rebuild housing in Kobe, Japan, after the 1995 Hanshin-Awaji earthquake. In New Orleans, the recovery since Hurricane Katrina made landfall in 2005 has been extremely uneven, with high out-migration, limited home repairs, persistent vacancies, and very few new rental units replaced (SPUR, 2012).

In San Francisco, where 75 percent of the city dwellers are renters, 25 percent of the city's housing would be rendered uninhabitable in a magnitude (M)7.25 earthquake on the San Andreas Fault. The city does not have enough shelter capacity, much less interim-housing capacity, for that population (SPUR, 2012). This shortage is not unique to San Francisco. In urban settings around the world, renters and squatters make up 30 to 70 percent of the housing market (Mukherji, 2011, 2010) and have limited capacity to find alternate housing after disasters.

Everyone who loses their home in a disaster has needs greater than shelter. They need to replace their possessions—clothes, medicine, car, bicycle, documents, and so on. They need to know if they have a job, if their children will have a school, if an injured family member can get medical care, or if health care will be available for chronic and routine needs. If they are homeowners, they depend on rulings from local government regarding the safety of their dwelling and permits for repairs, if they can finance the repairs. Legal renters have to find alternatives (with some federal assistance), but shadow renters (families who double up, those in short-term single-room occupancy rentals, squatters, immigrants, and so on) also need alternatives and have no status in government programs. They can seek help only from churches and nongovernmental organizations (NGOs).

All those who lose their homes, however, need to decide whether to stay (rebuild or find alternative accommodations) or to leave the disaster area, and they all need information. What they need is an understanding of what help is available to them and what public decisions will affect their private decisions. Individuals' capacity to stay in a disaster-affected jurisdiction is as much about their jobs and the availability of services as it is about how to solve their shelter problem. Will the incentive to stay be greater if individuals and families are engaged in a community process? Will the programs enhance individual and community resilience? Examples from Chile and New Zealand, discussed in the next section, represent two different approaches. In Chile, the national effort to rebuild low- and moderate-income housing is an attempt to improve housing standards and to promote community empowerment and economic development. In New Zealand, the availability of government insurance is funding repairs at the same time that government policies are focused on regulating land use and improving building standards to inform individual decisions.

Lessons From Chile and New Zealand

Comparing the disaster losses and recovery programs of different countries is extremely difficult when local conditions make each situation unique, but some generalizations can be made. The greatest loss of life tends to be concentrated in developing countries, whereas substantial property losses typically are a result of urban disasters in developed countries. The scale of housing loss is a combination of the disaster's intensity, the level of building code enforcement, and the quality of construction. Housing recovery (and recovery in general) is often a combination of a proactive government role in the reconstruction process, funding, community participation, and resilient improvements in infrastructure and planning.

To measure the success of recovery, it is important to look at different scales of intervention over different timeframes. Success in recovery will depend first on the scale at which that recovery is measured: at the level of the individual or household, at the level of the neighborhood or community, or at the level of the city or region. Success in recovery will also depend on the timeframe in which recovery is measured: in years or in decades. Finally, the degree of success in recovery will depend on the perspective of the evaluator: a family, a community, a government, an outside funder, or an independent evaluator (Comerio, 2005).

With the caveat that comparisons are difficult and tempered by differing perspectives and timeframes, it can be useful to compare Chile's and New Zealand's housing recoveries, along with those in other countries with a strong central government role in recovery management, with housing recoveries in countries characterized by a more limited government role. Exhibit 1 provides a comparison of losses in six recent disasters. Three recoveries (in Chile, China, and New Zealand) had strong

Exhibit 1

Comparison of Losses in Selected Recent Disasters

	Strong National Government Role in Recovery			Limited National Government Role in Recovery		
	Chile	China	New Zealand	Haiti	Japan	United States
	M8.8 earthquake and tsunami, 2010	M7.9 Sichuan earthquake, 2008	M7.1/M6.3 Canturbury/ Christchurch earthquakes, 2010–11	M7.0 Port-au-Prince earthquake, 2010	M9.0 earthquake and tsunami, 2011	Hurricane Katrina, 2005
Damage value ($ billions)	$30	$30–50	$40	$12	$300+	$80–150
Housing units lost (thousands)[a]	370	5,000	17	300+	113[b]	500
Deaths	526	90,000	184	316,000	19,000	1,970

M = magnitude.

[a] Housing units lost is an attempt to quantify those units that were uninhabitable after a disaster. The number of units damaged is much greater in all cases.

[b] Plus 82,000 evacuated because of nuclear radiation.

national government leadership, and three (Haiti, Japan, and the United States) had more limited government roles. Note that all the countries listed, except Haiti, have building codes that are similar to those in the United States, although construction practices and oversight vary.

Housing Recovery in Chile

On Saturday, February 27, 2010, at 3:34 a.m. local time, an M8.8 earthquake struck the south central region of Chile. The earthquake produced a tsunami that caused major damage over 630 kilometers of coastline. The earthquake and tsunami impacted 75 percent of the population of Chile, which is concentrated in six central regions. Overall, some 370,000 housing units (10 percent of the housing in the six regions) were affected. Of those units, 220,000 (60 percent) were rebuilt with government assistance and 150,000 (40 percent) were repaired or rebuilt privately, often with insurance. Of the 220,000 units targeted for government assistance, 109,000 involved repairs of damaged homes and 113,000 required rebuilding (MINVU, 2011). Within a few months after the earthquake, Chile developed a national reconstruction plan that required special legislation and funding through various business taxes and (unaffected) property tax increases. The plan covered major sectors, including infrastructure, hospitals, schools, and so on. Housing, a central element of the plan, was managed by the Ministry of Housing and Urban Development (MINVU). MINVU, whose mission is to improve the quality of housing for vulnerable populations, thought the earthquake and tsunami overturned 4 years of housing program efforts to reduce the already existing housing deficit (Comerio, 2013).

The reconstruction plan was aimed at low- and middle-income populations (annual incomes of less than $12,000 per family per year and home values of less than $88,000). The process involved coordinating more than 239 municipalities and included reconstructing temporary and permanent housing, urban planning, and reconstructing historic heritage. More than 70 percent of the homes to be rebuilt were on sites where the beneficiaries had a house before the disaster, which meant that, in Chile, recovery policy was focused on keeping families in their communities, limiting greenfield developments, and improving seismic and thermal rebuilding standards in rural and urban localities.

A variety of options were available to qualified families: funds to repair an existing house, to acquire a new house, to build a new house on the owners' land, to build a house on a new site, or to build units in social housing (see exhibit 2). Repair funds were dispersed in three increments (of 30, 30, and 40 percent) to ensure that funds were used for construction. Landowners needing new homes could choose from models based on presentations from several predominantly local builders, some of whom offered prefabricated homes, some of whom offered site-built homes, and all of whom MINVU precertified for engineering standards. After the community voted, the builder received the contract for that community—providing some advantages of scale for builders in remote regions and encouraging competition among builders. Families could also add additional rooms or special finishes after the base unit was provided.

Families without land were accommodated in temporary camps while social condominium projects were designed and completed. These projects typically improved on previous housing quality in terms of unit size (from 38 to 50 square meters), services, and site amenities. In cities such as Talca, where 30 percent of the housing stock was damaged, additional subsidies enabled builders

Exhibit 2

Breakdown of Number of Units by Programs

Approach	Problem		
	Repairable House, Landowner	Nonrepairable House, Landowner	Nonlandowner
Family led	12,000 use banks of materials for repairs	3,000 acquisitions 3,000 do-it-yourself buildings	16,000 acquisition subsidies
State led	32,000 social condominium repairs	8,000 social condominium demolitions/ rebuildings	30,000 new developments
Third-party intermediary led	84,000 repair subsidies	48,000 precertified houses	4,000 urban densifications

Source: MINVU (2012)

to work on inner-city sites in an attempt to counteract the rush to build on the periphery. In coastal cities, new master plans were developed for tsunami protection, infrastructure, and urban relocations.

Within 1 year after the earthquake, 60 percent of the government subsidies were allocated, 35 percent of the housing was in construction, 5 percent of the new housing was complete, and all insurance payouts were complete. After 2 years, all the subsidies were allocated and about 70 percent of the home repairs were complete, but only 10 percent of the new construction was complete, although 45 percent had started. After 3 years, 68 percent of the government-funded housing was complete and, at the fourth anniversary, in February 2014, nearly all 220,000 units were complete (Comerio, 2013).

The Chilean government's housing program demonstrates an effort to combine new, safe building technologies with local vernacular lifestyles and to improve the welfare standards for a significant population. The program is also remarkable because it reflects a policy that kept most of the reconstruction as part of the urban fabric instead of in greenfield developments. It was conceptualized and funded at the national level, but local and regional agencies handled management and implementation—with oversight from local architects and engineers and construction competitively bid by local builders. Plans for hazard abatement were integrated into coastal redevelopment, and efforts were made to rebuild with greater density to counteract exurban development. What is important to success in the Chile case is the combination of political will, funding, strong leadership, flexibility in adapting existing programs, and professional best practices (Comerio, 2013). The overall program was extraordinarily successful in terms of replacement housing, improved building standards, improved resilience for future disasters, and maintained community cohesion.

Housing Recovery in New Zealand

In the early hours of Saturday, September 4, 2010, people in Christchurch and the surrounding Canterbury region of New Zealand were surprised by an M7.1 earthquake, the most damaging earthquake to hit the country since 1931. The epicenter was located west of the city, which experienced moderate shaking levels, but the earthquake caused major damage because liquefaction

and lateral spreading affected sewer and water lines and damaged home foundations. The earthquake caused significant nonstructural damage but limited structural damage to buildings throughout Christchurch. This event was followed by thousands of aftershocks (Geonet, 2012). The most damaging occurred on February 22, 2011, when a shallow M6.3 earthquake devastated the central business district and caused widespread foundation movement and extensive utility loss across the city, with the heaviest liquefaction damage in the eastern suburbs (EERI, 2011).

Christchurch, a city of about 400,000 people and the largest city on the South Island, has a housing stock composed primarily of well-built, single-family, wood-frame homes, with only a smattering of condominiums and apartments. Approximately 87 percent of the homes in greater Christchurch were damaged. Of those, 30 percent had major damage and 70 percent sustained minor damage (EQC, 2012; Markum, 2012). In most cases, liquefaction and subsidence were the predominant causes of damage and ongoing problems. In a country with a population of only 4 million, the national government took a proactive role in recovery. It established the Canterbury Earthquake Recovery Authority (CERA) to act as facilitator and coordinator, particularly for planning and implementing the downtown and infrastructure recovery. The government insurance program, the Earthquake Commission (EQC),[2] managed residential claims. EQC provides earthquake and fire insurance that is required with every mortgage. Approximately 95 percent of New Zealand homeowners have EQC-backed earthquake insurance coverage.

At the time of the earthquakes, an EQC insurance policy cost homeowners $67.50 New Zealand dollars (NZD) per year and provided protection of up to $100,000 NZD for a dwelling (building) and $20,000 NZD for contents (personal belongings). If the site was destroyed (originally conceptualized for landslides, but applicable in the liquefaction zones), an amount for the land lost could also be added. When the actual damage was beyond the EQC limit, homeowners were responsible for the difference, either from savings or additional private insurance (EERI, 2010).

Although the EQC was well capitalized, the courts ruled that claims from each event must be covered separately, which led to a situation in which EQC was managing more than five times the number of claims as there were damaged homes. The claims furthermore had to be apportioned over 12 different events among EQC, primary insurers, and reinsurers (King et al., 2014). At the end of May 2013, 1,000 days after the first earthquake, only 45 percent of the residential claims were settled (Gates, 2013). Although the funding for repairs will ultimately be available to homeowners the settlement process has been incredibly complicated, not only by the number of events and the apportionment of claims, but also by government decisions to limit development in liquefaction zones and require improved building standards for foundations in large portions of the city.

Land was zoned red (no rebuilding allowed), orange (further study needed), or green (rebuilding allowed) based on geotechnical studies and assessments of where utilities could be replaced. More than 7,000 homes in the red zones were offered a buyout package to leave their unsalvageable houses. The government bought their land (more than 700 hectares, or 2.7 square miles), which is now subject to an increased threat of river and ocean flooding. Another 2,500 homes in the orange zone were on hold for many months, pending further study. The Department of Building

[2] In 1945, the government established an insurance program to protect its residents from the financial impacts of war. Later, it repurposed this program as coverage for natural catastrophes such as earthquakes, landslides, tsunamis, volcanic eruptions, hydrothermal activities, and floods.

and Housing subdivided the green zone into three subzones. There, 10,000 to 15,000 homes in technical category (TC)3 will require substantial foundation work to be considered habitable. The homeowners in TC3 homes are afraid they will not be able to afford the added cost of complex structural foundation repairs, which are not covered by insurance settlements. They are also concerned they may not be able to sell a TC3 home in the future (Markum, 2012).

TC1 homeowners are free to rebuild according to the basic building code, but TC2 homeowners will have to have foundation plans reviewed. Despite homeowner anxiety, these engineering standards are critical to the city's long-term resilience. They represent a tough but important decision on the part of CERA to enact realistic standards for long-term land use given the effects on land and elevation changes resulting from liquefaction.

In the Christchurch, New Zealand case, the government acted quickly to establish CERA, recognizing the need for national government leadership in a disaster that caused losses of 20 percent of the national gross domestic product (GDP). Although the government was comfortable with the capacity of insurance to fund the housing recovery, no one quite realized how complex administering the staggering number of claims over multiple events with multiple payers would be. The longer timeframe and extra costs (higher repair costs for foundations, higher housing costs for those having to move) are pushing development to the outskirts of the city at the same time that civic leaders hope to entice development back into the downtown area. For residents, the 3- to 5-year wait for payment from insurance claims combined with rezoning and foundation standards are sources of considerable stress. Overall, the country has done remarkably well in organizing a recovery effort and maintaining extremely transparent processes. The Christchurch lesson, however, is that insurance should not be the sole predisaster recovery finance plan.

Government Recovery Management in Other Recent Events

Other nations have had differing approaches to housing recovery. The M7.9 Sichuan earthquake of May 12, 2008, in western China caused extensive damage in a large and remote region, destroying some 5 million homes. As a nation, China has stringent building codes, but regulations in the Sichuan region were less vigorously enforced, resulting in a high death toll. The central government took an active role requiring wealthier eastern provinces to contribute 1 percent of their local GDP for 3 years to the recovery in a program in which damaged cities were twinned with contributors. As is common in China, planning and central management were used to develop new towns and large-scale housing construction sites. The goal of moving families out of temporary housing after two winters meant little time to review building codes, little time to consult impacted residents about their desires or needs, and little environmental review of site selection (Peng et al., 2011).

In addition, no real choice of housing type or location was available to families. China's strong emphasis on expediency may have compromised overall construction quality and limited integration with jobs and social services. Thus, whereas the central government of China focused on a massive and speedy rebuilding program, it lost opportunities for sustainable development and hazards mitigation and opportunities to reduce social vulnerability through coordinated efforts in jobs, health care, and other services. Victims furthermore had little choice in their housing options, and many families were separated because the new housing was not near jobs.

The April 6, 2009 M6.3 earthquake in the Abruzzi region of Italy devastated 49 small towns and the central city of L'Aquila, leaving more than 60,000 people homeless. Within 6 months, the national government built base-isolated housing for 15,000 people on a variety of sites in the region. Intended as long-term temporary housing, the units will be repurposed as student housing after 20 years (Calvi, 2010). Although the effort was critical for many families with no housing options, larger recovery efforts have stalled for lack of funding. Families who did not receive the new housing lived in hotels and coastal towns (2 hours away) for 2 to 3 years, and many have relocated permanently. University students commute 2 hours from Avenzano. After 5 years, some rebuilding has begun on the outskirts of L'Aquila, but it is unclear how the university, the tourist industry, or local business will support the larger community recovery without greater housing stability.

Other examples of strong central government recovery management come from efforts after earthquakes in Turkey (for example, the 1999 Kocaeli and Düzce earthquakes) and in India (for example, the 1993 Maharashtra and 2001 Gujarat earthquakes). In these cases, World Bank funding was channeled through national and state governments to support rebuilding programs (Mukherji, 2011, 2010). Although the finance mechanisms were different, the approaches were similar to those in China and Italy, with heavy investment in replacement units in new developments. Some limited efforts by NGOs engaged small subsets of the affected population in self-building and repair programs.

In nearly all these cases, governments used existing agencies and programs to deliver housing after disasters. Some, as in Sichuan, China, and L'Aquila, Italy, were highly centralized with few opportunities for housing choice or participation in planning by the citizenry, whereas others provided varying degrees of flexibility and housing choice to earthquake victims. For the more recent events, it will be valuable to reexamine the relationship between housing construction and community economic and social stability 10 years after the event to see how the impacted populations have fared.

Limited Government Management With Private Investment

The United States and Japan are similar in their approaches to a more limited role for government in disaster recovery, with a focus on public funding primarily for infrastructure, limited government support for housing and private-sector recovery, and limited disaster insurance for homes.

Although Hurricane Sandy (which devastated portions of New York and New Jersey in October 2012) is now considered the largest U.S. disaster, it is too soon to assess recovery efforts, and it is more useful to review the aftermath of Hurricane Katrina, which devastated New Orleans and the Gulf Coast in August 2005. The damage was distributed over a large geographic area, but New Orleans lost 100,000 units (50 percent of city households) of the approximately 400,000 units damaged across the region. The city did not have enough capacity to provide temporary housing (such as mobile homes and trailers), and many families were evacuated to other cities and states (Olshansky and Johnson, 2010).

Flood insurance did not cover all the storm damage for homeowners who had insurance, because storm surge was not covered, and many homeowners who were behind levee walls did not have insurance because they were not in the designated flood plain. Politics, at all levels of government, hampered government assistance programs. Housing repairs and reconstruction required

substantial private investment, and relatively little low-income and multifamily housing was rebuilt. New Orleans now has about 25 percent fewer habitable housing units than it had before the storm. Since Hurricane Sandy came ashore, similar issues have come up in New York and New Jersey, where public investment in infrastructure will encourage private investment in high-income areas but leave lower income regions with few options for recovery finance.

Japan's March 11, 2011 M9.0 Great Eastern Japan earthquake and tsunami devastated a large coastal region, similar in scale to the region affected in the Chile earthquake. Because of the additional complexity created by damage to the Fukushima Daiichi Nuclear Power Station, housing recovery will go beyond the replacement of disaster losses to include long-term evacuation from undamaged communities affected by fallout. With limited insurance for homes, declining economies, an aging population in coastal fishing villages, and complex social adjustments for nuclear-displaced families, the recovery will be prolonged and require a combination of public and private investment. Coastal planning, similar to that undertaken in Chile to mitigate tsunami hazards, has been completed, but decisionmaking, distribution of funding, and plan implementation are taking place at the central government, prefecture, and local municipality levels without good coordination (Maki, 2012).

Past events in the United States and Japan—the 1989 M7.1 Loma Prieta (San Francisco Bay Area) earthquake, the 1994 M6.8 Northridge (Los Angeles area) earthquake, and the 1995 M7.2 Hanshin-Awaji (Kobe, Japan) earthquake—discussed subsequently—demonstrate the outcomes from a limited government approach to housing recovery.

Some 25 years after the Loma Prieta earthquake, major investments in public infrastructure have brought about the transformation of the San Francisco waterfront (resulting from the demolition of the Embarcadero freeway) and the rebuilding of the San Francisco-Oakland Bay Bridge and of museum, cultural, and civic buildings. The Hayes Valley neighborhood was also revitalized, with the replacement of the damaged Central Freeway with a boulevard design. By contrast, only 75 percent of the total housing destroyed by the earthquake was replaced within 10 years after the event. High-income areas recovered quickly, but many residents of low-income, single-room occupancy hotels and apartments were left homeless after the Loma Prieta earthquake. The time-consuming repair and replacement of these units were carried out largely by nonprofit housing groups, which meant that no additional units of government-subsidized affordable housing were added in the decade after the earthquake (ABAG, 2000; Comerio, 1998).

After the Northridge earthquake, nearly 300,000 owners of damaged single-family homes made claims on their earthquake insurance; repairs required 2 to 5 years to complete. Rebuilding multifamily housing was more difficult. Two-thirds of the 59,000 multifamily units declared uninhabitable required at least 5 years for repairs, and the remaining one-third were abandoned or torn down (Comerio, 1998, 1996). High rental vacancies in the San Fernando Valley and in much of the city of Los Angeles at the time of the earthquake provided families with relocation options, so people were not displaced. The rebuilt apartments typically served newcomers to the area.

In Kobe, some 400,000 housing units were damaged or destroyed. The government provided 48,300 temporary units, which were occupied for 6 to 8 years after the event. A complex planning process involved a variety of land use and zoning adjustments, which were effective but time

consuming, to aid the rebuilding process. The government set a target of 125,000 replacement housing units, of which 38,600 were designated for low-income people. The Phoenix Plan stated that two-thirds of the new units were to be built by the public sector and one-third by the private sector. After 5 years, private-sector housing was being built much faster than public-sector housing, particularly in outlying areas (Olshansky, Johnson, and Topping, 2005; Preuss, 1998). Although the national government ultimately met the overall housing replacement goal, many earthquake victims were displaced, and new housing in Kobe served a gentrified population. Some 10 percent of Kobe's population left the city, and it took 10 years for the population to return to predisaster levels (Maki, 2012).

The United States and Japan are developed nations that make some investment in post disaster housing. Their policies, however, suggest that they are willing to accept a greater reliance on the private sector for disaster recovery, even if that recovery is uneven across income groups. In developing countries, a limited government role in disaster recovery can extend the hardships for disaster victims.

The devastating losses in Port-au-Prince, Haiti, from the January 12, 2010 M7.0 earthquake—in terms of the number of deaths and the physical losses in housing, schools, hospitals, and public buildings—extend to the capacity to manage the country. Haiti lost a significant portion of its weak national government in the earthquake and was already dependent on NGOs for many social services (Farmer, 2011). For any developing country, the losses incurred in natural disasters are in part products of their predisaster conditions—poverty and lack of jobs, education, and training. After a disaster, the problems are often compounded by the unintended consequences of international aid. In Haiti, less than 1 percent of the aid went to the public sector; yet, long-term recovery requires a functioning public sector. An NGO can build a school or a clinic, but the building is of limited use without a public mechanism to pay teachers or nurses.

Only 3 percent of the donor funds were spent on permanent housing (Sontag, 2012), and, as of April 2013, individual households had constructed nearly 10 times as many housing units as had international agencies. Now 4 1/2 years after the earthquake, 172,000 residents are still in tent camps (Konotchick, 2013), and much remains to be done in addition to providing housing, including resolving landownership, developing public services (water, sanitation, education, and health care), providing job training, and developing the economy.

Comparison of Approaches

When the housing recovery in a variety of countries is reviewed, two metrics stand out: (1) a strong government role in funding, management, and coordination improves housing reconstruction; and (2) more individual choice in housing combined with citizen participation in larger planning processes improves citizen recovery.

The chart in exhibit 3 provides a way to look at the balance between government roles and community participation in various recovery efforts (Comerio, 2012). The placement of each country is based on the author's judgment, but the aim is to represent the variety of approaches used. The

Exhibit 3

Comparison of Recovery Management Approaches

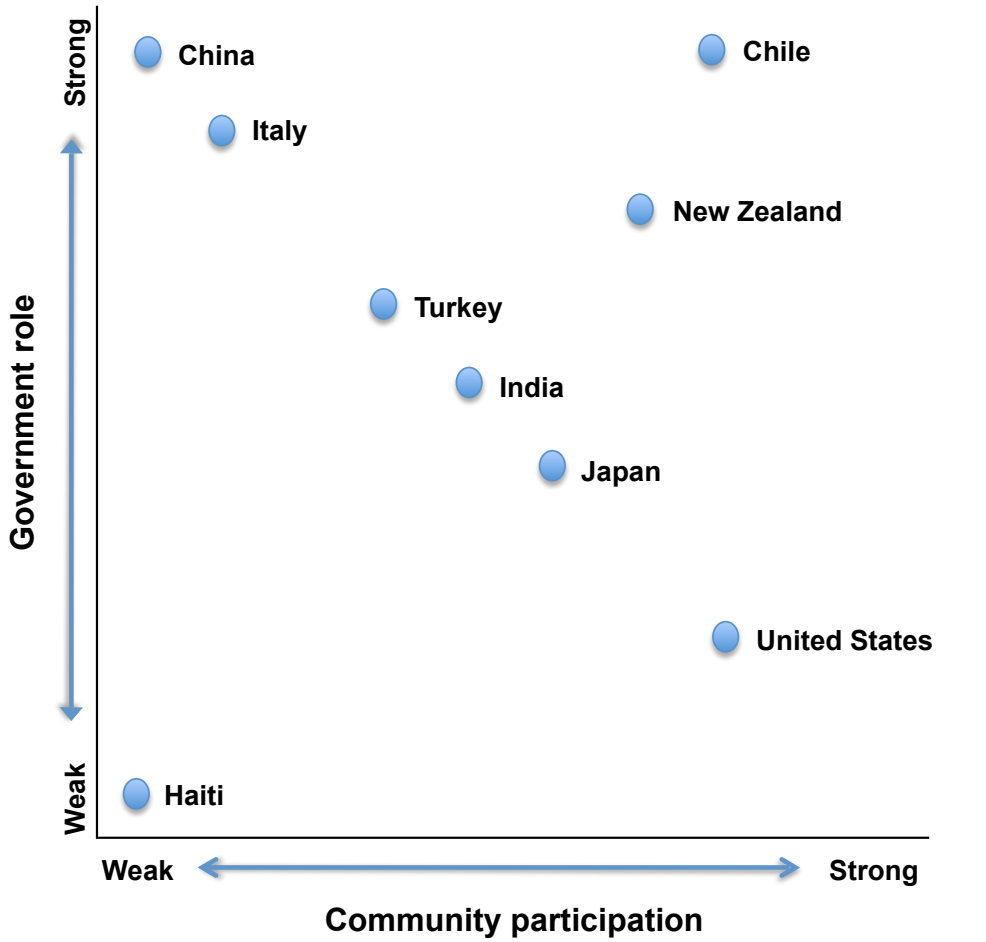

chart shows that Chile and New Zealand have combined both "top-down" and "bottom-up" approaches, providing government leadership and funding along with community empowerment in decisionmaking. It is important to recognize that these approaches are not mutually exclusive and can be combined effectively.

By contrast, China and Italy took strong government leadership roles in providing replacement housing but did not engage local communities in most aspects of the decisionmaking. Turkey and India had mixed programs—with some housing developed by government in large tracts and some village programs in which NGOs worked with residents on self-help construction. The United States and Japan provided strong leadership during the emergency phase and funded some aspects of recovery, such as infrastructure and public facilities, but left most of the housing reconstruction to the private market. Haiti's weak government and high poverty levels limited recovery from both perspectives.

In the future, countries with major housing losses in a disaster can learn from the experience of others and attempt to find the "sweet spot" that provides the best of government management, for expediency and flexibility, and incorporates opportunities for citizens to take some control over their own recovery, with housing choice and participation in plans for the community's future. In this regard, Chile's performance stands out.

Conclusion

After a disaster, people who have lost homes and all semblance of normal life may be confused, disorganized, and demoralized. They grieve for what was lost. Their needs go beyond physical replacements. People-focused approaches—that is, recovery programs that engage citizens in decisions about the future—have the advantage of empowering these individuals, turning passive into active, turning lack of control into control, and promoting community engagement. Psychiatrist Craig Van Dyke (2012: 1) wrote, "…the grief literature describes the endpoint of successful mourning as a point when the individual is capable of making new emotional investments in the future. It is not defined by happiness or even well-being. Rather it is an acknowledgment that one is forever changed, but it is time to get on with life and make new investments and not have one's personal development permanently arrested."

A community likewise cannot go back to how things were before a disaster but must adapt and move forward. A few simple lessons emerge from recent experiences that can be useful in coping with a large-scale disaster and extensive housing losses.

1. Disasters create anxiety and opportunity. It takes government leadership—at national and local levels—to manage both.
2. Housing (and funding for all types of housing) is essential to recovery.
3. Government leadership is crucial.
4. Cooperation between the national and local levels of government is important—programs need local input and cooperation to succeed.
5. Existing government programs must be flexible and adaptable to meet postdisaster needs.
6. Recovery takes time to implement. In the first year, it may be possible to fix basic infrastructure, but major urban redevelopment and new civic institutions can take 10 to 20 years.
7. While managing information for citizens in an ongoing effort, a long-term vision helps to explain the realities of construction times and the social and economic recovery goals.
8. Balancing government assistance and individual responsibility, government leadership, and community involvement is essential in all recovery efforts. Postdisaster assistance should enable citizens to recover, not create entitlements.

The U.S. government could improve its disaster recovery programs without a major overhaul of current policies by using the National Disaster Recovery Framework to expand and structure coordination between federal agencies and local governments and to focus on unmet housing

needs. A few examples of specific strategies might include case management for disaster victims, targeting recovery funds for rental and affordable housing, and advancing shelter-in-place strategies and other short-term housing solutions to keep people in their communities. The examples from various nations demonstrate the many ways to manage disaster recovery. Each nation can learn from the experiences of others, however, and develop policies and programs that focus on recovery and community renewal.

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