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Disaster Resilience *Concepts, Measures, and Critiques*

Introduction

In disaster research and risk reduction policy and practice, it is difficult to find a concept that has achieved so much influence so rapidly as the notion of disaster resilience. Recent scholarship has given the impression that the idea of resilience is relatively new; but, as David Alexander (2013) notes, this general notion has a long history that can be traced back to Roman authors such as Quintilian, Pliny the Elder, and Cicero, the early Christian church, and Tudor England, where resilience was associated with processes of rebounding and elasticity. Its use in the field of engineering mechanics dates back to the mid-nineteenth century—for example as a way of characterizing strength and flexible properties of steel and other materials. The concept began to be used more widely in the twentieth century, but jumped to prominence after 2000.

In academic research, the notion of resilience, like that of vulnerability, is used in a wide range of disciplines. In the mid-twentieth century, the concept began to be employed in the study of complex adaptive systems such as ecological ones, as well as in psychology, where it was advanced to explain why some children and youths who were exposed to stressful situations were able to cope despite those stressors, while others were not (Rutter 1987). With the contributions of scholars like Holling (1973), Adger (2000), Folke et al. (2002), and others, frameworks used in the study of ecological systems began to be applied to social systems—although, as we will see later, there are problems with that analogy. Economists have also focused on the concept of resilience as a way of understanding how individual firms and regional and national economies recover from external shocks such as hikes in the price of energy (Dhawan and Jeske 2006) and production losses (Park, Cho, and Rose 2011). The concept is also prominent in work on environmental and development economics (Perrings 1998; 2006). Again like the concept of vulnerability, resilience has increasingly emerged as a theme in development studies and in research on global environmental change, including climate change (Gallopín 2006; Janssen and Ostrom 2006; Pelling 2011; Denton et al. 2014).

The growing use of the concept in the study of hazards and disasters is a more recent development. Resilience was discussed in the summary volume of the Second Assessment of Research on Natural Hazards (Mileti 1999), but the concept began to rise to prominence a few years later. An article on earthquake resilience (Bruneau et al. 2003) is an early example of this trend, as are other works published around that time (see Pelling 2003). Since then, there has been an avalanche of books (for example Comfort, Boin, and Demchak 2010; Shaw and Sharma 2011; Miller and Rivera 2011; Kapucu, Hawkins, and Rivera 2013; Ross 2014;

Masterson et al. 2014) and hundreds of articles on various aspects of societal resilience in the face of hazards and disasters.

With respect to public policy, the notion of *disaster-resistant communities* was advanced in the United States in the 1990s as part of the Federal Emergency Management Agency (FEMA)'s National Mitigation Strategy; it was part of that agency's sponsorship of a short-lived program called Project Impact, which was designed to provide incentives and guidance to hundreds of communities in order to encourage local-level risk analyses, public communication, and partnership-building activities. The ultimate goal was to reduce disaster-related risks and losses (Cutter et al. 2008; Tierney 2014). However, beginning in the early years of the twenty-first century, the emphasis began to shift away from a conceptual framework that emphasized *disaster resistance* to one that placed priority on *disaster resilience*, thereby taking into account the ability to resist negative disaster impacts while remaining functional, but also the capacity for "bouncing back" after disasters in case resistance strategies failed to contain those impacts.

Resilience has become increasingly dominant in disaster risk reduction discourse and policies. Somewhat arbitrarily, we can associate the beginning of this shift toward resilience in the policy arena with two events: the publication of a US federal government document entitled *Grand Challenges for Disaster Reduction* (Subcommittee on Disaster Reduction 2005), which emphasized the need for measuring and improving disaster resilience; and the United Nations International Strategy for Disaster Reduction's (2007) Hyogo Framework for Action, which was released after a major disaster-related conference in Kobe, Japan in 2005—which in turn marked the tenth anniversary of the Great Hanshin-Awaji (Kobe) earthquake. As I discuss elsewhere (Tierney 2014), in the past ten to fifteen years the concept of disaster resilience has been emphasized in a variety of other publications and policy initiatives, including the 2007 National Strategy for Homeland Security; the 2010 National Security Strategy; the 2010 Quadrennial Homeland Security Review; and the Presidential Policy Directives 8 (National Preparedness) and 21 (Critical Infrastructure Security and Resilience). Many US federal government agencies now have programs that aim at enhancing disaster resilience at different levels—national, regional, state, and local. Some of those initiatives will be discussed later in this chapter.

Within the nongovernmental sector, the US National Academies of Sciences, Engineering, and Medicine are engaged in a number of activities that focus on community and societal resilience, as evidenced, for example, in a report on public–private partnerships as vehicles for enhancing community resilience (National Research Council 2011). The Academies report entitled *Disaster Resilience: A National Imperative* (National Research Council 2012) pressed for action on resilience conceptualization, measurement, and initiatives. The Community and Regional Resilience Institute (CARRI) has sponsored a series of activities aimed both at resilience conceptualization and measurement and at community-focused resilience-building activities. Both in the United States and around the world, academic centers and think tanks focus on resilience research and policymaking.

A variety of other efforts are indicative of the growing concern with disaster resilience. The

World Bank has made resilience in the face of disasters and climate change a key priority in its programs that target developing countries (World Bank Group 2013). The Asia-Pacific Economic Cooperation forum (APEC) also emphasizes disaster resilience as a major concern (Asia-Pacific Economic Cooperation 2015). In the United Kingdom, the influential Department for International Development (DFID) has made enhancing disaster resilience a core approach in its strategy for providing aid to less developed countries (Department for International Development 2011). In 2013 the Rockefeller Foundation launched its 100 Resilient Cities program, which aims at making communities worldwide more resilient in the face of both acute shocks such as disasters and chronic stressors; and recently it teamed up with the US Department of Housing and Urban Development (HUD) on a national competition for enhancing community resilience in the United States. Australia has adopted resilience as a guiding principle in its own humanitarian efforts. New Zealand, which suffered a series of damaging earthquakes in 2010 and 2011, has been developing a national resilience strategy, and many nongovernmental organizations (NGOs) have also been formed in that nation under the resilience rubric. The European Commission prioritizes resilience in its provision of development and humanitarian assistance. The United Nations International Strategy for Disaster Reduction (UNISDR) Hyogo Framework, which ended in 2015, was superseded by the Sendai Framework for Disaster Risk Reduction 2015–2030, which made risk reduction and resilience (taken together) one of its four major priorities.

In this chapter we will explore the meaning of the concept of resilience, look at approaches to measuring resilience, and investigate the applicability of the concept in the study of disaster response and recovery. We will also consider criticisms of the concept and conditions that place limits on resilience capacities. As we did in the previous chapter with vulnerability, we will focus on issues that are relevant to a social–scientific understanding of disaster resilience.

What Is Disaster Resilience?

Conceptualizations and definitions

As is so often the case in academic and policy circles, there is no universally agreed-upon definition of resilience. In a broad overview of the use of the term in various fields, Plodinec (2009) identified no fewer than forty-six different definitions of the concept. Community psychologist Fran Norris and her colleagues (Norris et al. 2008), who focused more on the societal aspects of resilience, listed twenty-one different framings of the concept. Here I offer a few commonly used definitions that provide a sense of how resilience is used in the social science disaster literature. Bruneau et al. (2003: 735) defined earthquake resilience as “the ability of social units (e.g. organizations, communities), to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimize social disruption and mitigate the effects of future earthquakes.” Similarly, Cutter et al. (2008: 600) define disaster resilience as “the ability to survive and cope with a disaster with minimal impact and damage ... [along with] the capacity to reduce or avoid losses, contain

the effects of disasters, and recover with minimal social disruption.”

In a thoughtful review of the social and psychological literature, Norris et al. (2008) refer to the concept of resilience as a metaphor borrowed from nonsocial science fields, but also as a theory focused on adaptation after shocks and traumas, as a set of capacities, and as a strategy for reducing disaster losses. According to their definition, resilience is “a process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance” (2008: 130).

The 2012 National Academies’ report defined disaster resilience as “the ability to prepare and plan for, absorb, recover from and more successfully adapt to adverse events” (National Research Council 2012: 2). A recent World Bank publication defined resilience as “the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate, and recover from the effects of a hazard promptly and efficiently by preserving and restoring essential functions” (Jha, Miner, and Stanton-Geddes 2013: 10).

The current definition of disaster resilience adopted by the UNISDR frames resilience in an almost identical way:

In the context of disaster risk, the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including the preservation and restoration of its essential basic structures and functions through risk management. (United Nations International Strategy for Disaster Reduction 2017)

These definitions convey two ideas that most researchers and practitioners would agree are central to discussions of resilience. The first is that resilience involves *resistance* or *absorptive capacity*; a resilient person, household, organization, community, or built-environment system is one that can experience a major stressor such as a disaster and still function reasonably well, even if part of its functioning has been reduced. Second, resilience involves the ability to *cope and adapt* when disasters strike and to move on to recover. Put another way, depending on the size and severity of a disaster, some or even many resistance measures may fail, but adaptive strategies can help overcome those failures.

The resistive and absorptive aspects of resilience, sometimes referred to as inherent resilience, encompass several types of activities that were previously identified in the literature as “disaster mitigation,” or measures that can be taken to reduce the likelihood that a hazard would produce impacts such as death, injury, damage, disruption, and economic loss. Perhaps the best way of minimizing disaster impacts is to avoid dangerous locations in the first place by ensuring that people and structures are not situated in places where they are exposed to hazards—for example, in hazardous coastal zones, floodplains, locations adjacent to active earthquake faults, and places at the wildland–urban interface that present a high risk of wildfires. This is the purpose of hazard-related land use and zoning regulations; but, as we have seen in earlier discussions, such regulations are lacking or are not enforced in many parts of the world and, where they do exist, political and economic actors frequently work to circumvent them. There is also the problem that certain hazards may not have been well

understood when human settlements were first established, and this left a legacy of hazard exposure. At the same time, as noted at various points in this volume, the ongoing tendency to develop land even when hazards are recognized is a key contributor to burgeoning disaster losses, as Houston demonstrated in Hurricane Harvey in 2017.

If hazards cannot be avoided entirely, a second line of defense is to ensure that the built environment can resist the forces unleashed by disasters. As more is learned about how elements in the built environment can fail in disasters, this knowledge serves as guidance for improving disaster resistance—for example, through measures such as building codes that encourage or require hazard-resistant design and building practices and through programs that retrofit older structures to make them safer. Around the United States, many communities have steadily improved their requirements for building and infrastructure safety—but many others, typically facing opposition from political and economic interests, have resisted making such changes.

Two earthquakes illustrate the significance of the “resistance” dimension of resilience. On January 12, 2010, a magnitude 7.0 earthquake struck Haiti, causing widespread devastation in the capital of Port au Prince and surrounding areas. The number of deaths attributable to the earthquake is still in dispute; estimates range between tens and hundreds of thousands. Just a few weeks later, on February 27, a massive 8.8 earthquake struck off the coast of Chile, causing intense ground shaking and a tsunami. Although the effects were very severe everywhere, including in Chile’s capital, Santiago, estimates suggest that just over 500 people died as a result of the earthquake. A key factor in mortality in Haiti was the lack of earthquake resistance in the built environment; large numbers of people died because they were crushed by collapsed buildings. In Chile, a nation that has a long history of violent earthquakes, the story was different. Many structures survived because they were designed and constructed to resist earthquake forces. Keeping in mind earlier discussions about vulnerability, the quality of the built environment in the two countries was in large measure a reflection of their relative prosperity: Haiti, an island nation that is the poorest in the western hemisphere; and Chile, still a poor country, but well-off enough to be able to invest in higher levels of earthquake safety.

When strategies to resist disaster impacts fail, those affected by disasters must cope and recover. The activities associated with this aspect of resilience, which were formerly termed “preparedness,” “response,” and “recovery,” enable individuals, households, organizations, and communities to address a wide range of needs that result from disasters. Such measures include pre-disaster foresight, planning, and training; warning systems; the mobilization of human and material resources in activities such as search and rescue and the provision of emergency medical care and shelter when disasters strike; efforts to contain secondary threats posed by disasters, such as hurricane-induced hazardous materials spills; and activities aimed at helping affected localities recover as soon as possible—for example debris removal, restoration of utility lifeline services, and the provision of temporary and permanent housing. Disasters can disrupt a range of critical community activities such as economic functioning, livelihoods, schooling, public health and welfare, transportation and other critical infrastructure systems, and housing. The adaptive dimension of resilience seeks to provide

temporary and longer-term fixes that address these disruptions. As Paton and Johnston (2006) note, this set of adaptive processes involves not merely a return to the *status quo ante*. Rather adaptation always brings about change of some kind, and successful adaptation should lead to improved resistance and adaptive strategies. In this sense, adaptation after disasters can be seen as “bouncing forward” instead of merely “bouncing back.”

Keeping these two aspects of resilience in mind, many discussions of the concept represent resilience graphically, in terms of the degree of degradation of key community and societal functions and the length of time required to restore those functions. Following Bruneau et al. (2003) and taking the community and its various systems (e.g., transportation, lifelines, educational institutions, health care systems) as units of analysis, the graph in [Figure 7.1](#) represents a fictitious community in which effective resistance measures are in place and coping and adaptive strategies are working well enough for the community to overcome disaster-induced disruption. The triangular dark area represents the extent to which systems are not resilient, but in this case the “resilience triangle” is small. In the graph in [Figure 7.2](#), resistance strategies are weaker, leading to a significant loss of system performance, while coping measures are not enacted in a timely way or are insufficient to address disaster impacts and losses. In this case, as indicated by the size of the dark resilience triangle, there is less resilience. The goal of resilience-enhancing measures is to make that loss of performance—that triangle—as small as possible.



Figure 7-1 Less degradation of system performance, more resilience.

SOURCE: Bruneau et al. 2003.

While scholars mostly agree on the importance of these two elements of resilience, they diverge on other points. For example, some researchers, such as economist Adam Rose, place more emphasis on the “coping and adapting” dimension of resilience—what he calls dynamic resilience (a notion to be discussed later in this chapter, see pp. 191–2)—than on absorptive capacity. They also differ in the ways they envision resilience. As seen in the definitions presented above, some view resilience as a property associated with different units of analysis (e.g., households, communities), while others see it rather as a set of processes that

achieve particular resilience-related outcomes. In keeping with the characterization of vulnerability in previous discussions, my approach views resilience not so much as a state but more as a set of processes or activities that societies and communities undertake in their efforts to reduce disaster-related risks.

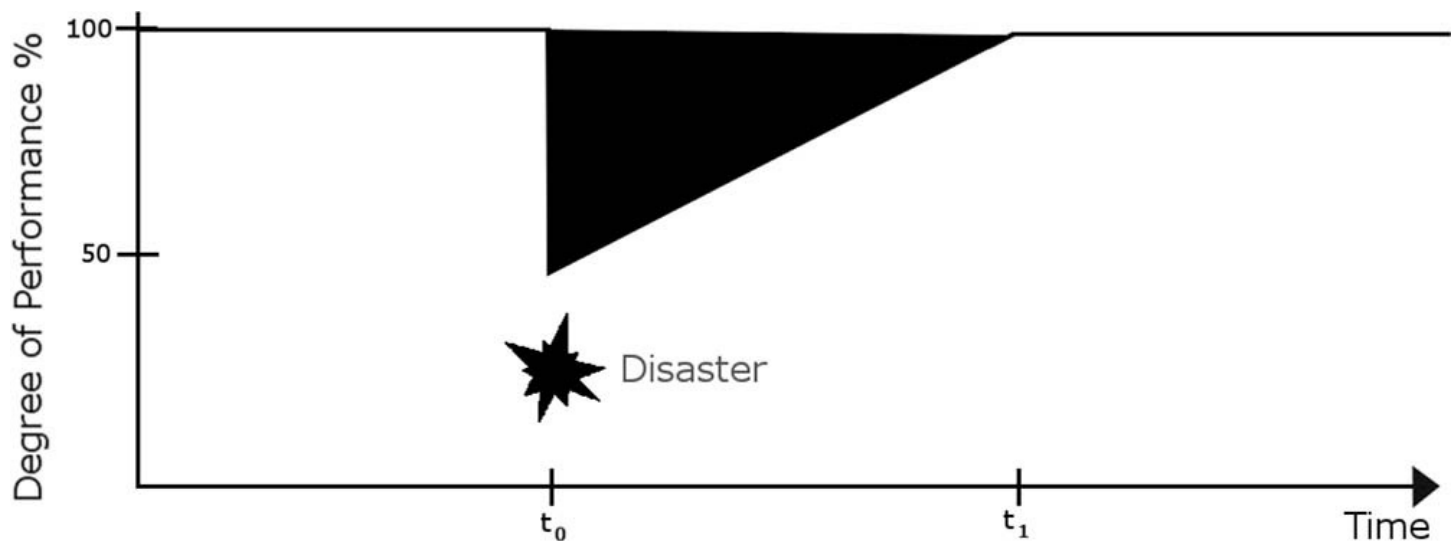


Figure 7-2 Greater degradation of system performance, less resilience.

SOURCE: Bruneau et al. 2003.

It is easy to assume that resilience is the opposite of vulnerability—that is, that the most socially vulnerable individuals and groups are the ones who have the greatest difficulty being resilient in the face of disasters. While the two concepts are clearly related, resilience is not the obverse of vulnerability. Vulnerability is indicative of the potential for experiencing disaster losses; but, as we will see later, members of vulnerable groups can be resilient as a consequence of factors such as social support and personal ability to adapt and innovate in the aftermath of disasters.

Resilience domains

The resilience literature and the guidance on becoming resilient point to various aspects of communities that can be the focus of resilience-building strategies. Bruneau et al. (2003) emphasize four resilience domains: technical, organizational, social, and economic. Paton and Johnston (2006) identify five elements of community resilience: knowledge of hazards, shared community values, established social infrastructure, positive social and economic trends, partnerships, and resources and skills. Renschler et al. (2010) identified seven dimensions of community resilience: population and demographics; environmental and ecosystem; organized governmental services; physical infrastructure; lifestyle and community competence; economic development; and social and cultural capital. Geographer Susan Cutter and her collaborators view resilience as having six dimensions: ecological, social, economic, institutional, and infrastructural, as well as community competence (Cutter et al. 2008). Guidance from the World Bank (Jha et al. 2013) points to four dimensions of urban resilience: infrastructural, institutional, economic, and social.

Approaches that are most relevant for the sociological analysis of resilience tend to emphasize the role of different forms of community capital in shaping resilience. Following Bourdieu's (1986) original formulation, capital in this sense is the accumulation, transmission, and reproduction of wealth and monetary value (economic capital), which is the basis for the other forms of capital; credentials such as academic qualifications, along with other symbols of status (cultural capital); and network-based resources gained through connections with others (social capital). If we move now to social class, which is of interest here, social class position is associated with the extent to which members of different social classes possess these three forms of capital. Bourdieu's concept of capital has been influential in sociology and other fields, and this influence can be seen in current approaches to identifying the elements of resilience. For example, sociologists Liesel Ritchie and Duane Gill (2011) base their understanding of the dimensions of community disaster resilience on Flora and Flora's (2018) community capitals framework, which identifies seven types of capital: natural (for example, natural resources and ecosystems), financial, built, political, social, human, and cultural. Similarly, Mayunga (2009) sees resilience as based on social, economic, physical, human, and natural capital. For Norris et al. (2008), the key components of disaster resilience are information and communication, community competence, social capital, and economic development (which can be viewed as economic capital). Also focusing largely on capitals, Kendra, Clay, and Gill (2018) identify nine components of disaster resilience:

- capacity for improvisation in disasters,
- number and quality of physical and infrastructural resources,
- community capital,
- natural resources,
- institutional capital,
- political capital,
- human capital,
- economic capital,
- social capital.

As we saw in [Chapter 6](#) with respect to vulnerability to hazards and disasters, built-environment characteristics need to be taken into consideration in assessing vulnerability. The same is the case with resilience, as indicated by how frequently elements in the built environment are mentioned in efforts to identify key dimensions of resilience such as those just discussed. However, for our purposes we will home in on more societally relevant aspects of resilience. In particular, our focus will be on social capital, because it is closely related to other forms of capital such as economic, political, and cultural and because it is the form that has received the greatest emphasis in the social science disaster literature.

Social capital and disaster resilience

Social capital is fundamentally about social networks and connections. Bourdieu, who originally coined the term, defined social capital as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” (Bourdieu 1986: 248). Robert Putnam, an influential pioneer in social capital research, defines it as “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam 1995: 67). Other definitions of the term are similar: “the ability of actors to secure benefits by virtue of membership in social networks or other social structures” (Portes 1998: 6); “friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital” (Burt 1992: 9); and “resources embedded in a social structure which are accessed and/or mobilized in purposive actions” (Lin 1999: 35).

Social capital gives rise to norms, obligations, and a sense of trust among the members of a network and provides channels through which information can flow (Coleman 1988). Belonging to a network entails the expectation of reciprocity: someone does a favor to another individual in her friendship network that the other person will repay at a later point on account of feelings of obligation. Social embeddedness and a sense of belonging are characteristics of social capital, as are civic mindedness and civic engagement. As Putnam’s definition indicates, being connected enables network members to engage in collective action to realize their goals—for example, to achieve political or economic objectives.

Scholars generally recognize three forms of social capital that confer different types of benefits. *Bonding* social capital refers to the relationships that exist within a particular group, such as a local group working on issues of homelessness. *Bridging* capital consists of linkages that exist between two or more groups of different types, for instance groups composed of people with different ethnic backgrounds, or entities that were formed for different purposes. In effect, bridging capital widens the network of participants who work toward a common objective, making more resources available. Using the same example, bridging capital would exist if a number of community groups who work on different aspects of the homeless issue (housing, mental and physical health, homeless rights) agreed to join forces and to form a coalition to press for more services for those who are homeless. *Linking* capital involves relationships between groups and centers of power and influence, such as governmental entities. For example, to bring about that linkage, the coalition concerned with addressing the needs of the homeless population might get one of its members elected to city council, establish connections with state or national policymakers, or obtain a large grant from a major foundation. Without bonding social capital, individuals are isolated and lack access to the kinds of resources—for example, financial, informational, and emotional support—that members of cohesive groups enjoy. Without bridging capital, a group’s resources may be too limited to address members’ needs, or some group members may feel overburdened when asked to provide support. Without linking capital, groups lack connections to more powerful entities that would be in a position to increase their resources in relation to other groups. Where all three forms of capital are present, network members have the best chance of getting access to resources and achieving their goals.

Different approaches to conceptualizing social capital have yielded a variety of measures of the concept. Typical ways of identifying social capital take into account measures of political participation (voting), volunteering, density of and individual or household involvement in community NGOs, embeddedness in social networks, social support, community attachment (e.g., length of residence in a community, home ownership), frequency of participation in social activities, and feelings of trust and belonging. By contrast, low political and community participation, social isolation and marginality, transience, lack of community engagement, and sparse or weak NGOs are associated with low levels of social capital.

In the disaster field, Yuko Nakagawa and Rajib Shaw (2004) were among the first to argue that social capital contributes to disaster resilience. In their research, which involved recovery from the 1995 Great Hanshin-Awaji (Kobe) earthquake and the 2001 Gujarat earthquake in India, they demonstrated a relationship between bonding, bridging, and linking social capital and participation in and satisfaction with response and recovery efforts. Russell Dynes (2006) also linked social capital with disaster resilience, arguing that effective disaster responses both build upon and contribute to the development of social capital. Dynes noted that emergent groups and emergent organizational networks (EMONs), discussed earlier in connection with disaster theory, can be thought of as new forms of social capital that come about in order to address disaster-related challenges. Social capital is also associated with the development of norms—in this case, the altruistic norms that have added force in disaster situations, leading to extensive helping behavior. These points are echoed by writer Rebecca Solnit, whose book *A Paradise Built in Hell: The Extraordinary Communities That Arise in Disaster* (Solnit 2009) details how disasters are accompanied by strong feelings of community solidarity and a variety of forms of pro-social collective action.

In a comprehensive review of the literature on social capital and disasters, Michelle Meyer (2018) identified a number of studies that show that social capital, measured at either the individual or the community level, has a positive impact at various stages of the hazards cycle. For example, social capital is associated with mitigation and adaptation activities, adoption of disaster preparedness measures, evacuation behaviors, disaster responses, and positive recovery outcomes. Meyer also highlights a number of studies that link social capital and disaster resilience. Here I discuss a few such studies, which emphasize the link between social capital and post-disaster outcomes.

Sociologist Eric Klinenberg (2002) conducted research on the factors that contributed to mortality in the 1995 Chicago heat wave, which caused approximately 750 deaths. Selecting two apparently similar Chicago neighborhoods in which heat-related mortality differed significantly, he found that social ties and other variables associated with social capital were key factors associated with low death rates. In the neighborhood where death rates were higher, fear of crime kept people isolated in their homes, many residents were transients, and levels of social interaction and participation in community organizations were low. The neighborhood where mortality was low was a bustling commercial center where people interacted on a daily basis in stores and in the streets. Ties with extended family members were strong in that largely immigrant community and the Catholic Church served as a major community hub. Klinenberg concluded that high levels of social capital had a protective

function for otherwise vulnerable community residents.

Brenda Murphy (2007) focused on the role of social capital in two community emergencies that affected the residents of the Canadian province of Ontario. Walkerton, Ontario, a town of about 5,000 residents, was struck with an outbreak of *E. coli* when its water supply was contaminated. Seven people died of illnesses associated with contamination, and over 2,000 residents—about 40 percent of the population—became ill. Of those interviewed in the wake of the emergency, 60 percent reported providing some form of assistance to their fellow community residents, and 63 percent reported relying on family and friendship networks. Walkerton is a close-knit community with a high rate of participation in local NGOs, and interviewees indicated that their pre-disaster membership in such organizations formed the basis for their involvement in volunteer activities during the incident. In the August 2003 blackout, which was discussed earlier in [Chapter 6](#), Ontario residents who were surveyed reported both anticipating help from and providing help to others in their social networks, particularly those associated with their neighborhoods. In this emergency, mutual aid lowered the burden on public safety agencies, which were then able to turn their attention to other pressing tasks, such as rescuing people trapped in elevators and evacuating disabled persons stranded in high-rise buildings.

Other research reveals the connection between social capital and positive health and mental health outcomes after disasters. Following Hurricane Katrina, Adeola and Picou (2012) employed survey research methods to assess the link between social capital measures (e.g. home ownership, feelings of self-efficacy, involvement with community organizations) and physical health outcomes such as respiratory problems, headaches, nausea, and high blood pressure among Katrina survivors in hard-hit parts of Louisiana and Mississippi. They found that those with high levels of social capital had fewer health problems than those with low social capital. These same researchers looked at long-term patterns of psychological distress following Katrina and found that low levels of social capital were predictive of depression and psychosocial stress, and also that these negative mental health impacts were more common among blacks, older adults, unmarried adults, women, people with less education, and people with weak social networks (Adeola and Picou 2014).

Heid, Pruchno, Cartwright, and Wilson-Genderson (2017) studied the mental health of older New Jersey residents, between the ages of fifty-four and eighty, who were exposed to Hurricane Sandy in 2012. Controlling for other factors that could have influenced outcomes, they found that the severity of storm exposure was associated with more symptoms of post-traumatic stress disorder (PTSD), while respondents' perceptions of neighborhood social cohesion (a measure of social capital) was associated with fewer symptoms. Additionally, even for those with greater exposure to the storm, perceived social cohesion was associated with lower levels of PTSD. (For a review of other studies on social capital and post-disaster health outcomes, see Aida, Kawachi, Subramanian, and Kondo 2013.)

Technological disasters and social capital

Liesel Ritchie's research (Ritchie 2004, 2012; Ritchie, Gill, and Farnham 2013) focuses on

the relationship between disasters and social capital. However, in contrast with Dynes, Aldrich, and others, who emphasize how disasters can have a positive effect on social capital and how high social capital facilitates recovery, much of her work documents the ways in which disasters can damage social capital and community cohesiveness, particularly when the disaster agent is technological and the recovery period is protracted and accompanied by litigation-related community conflict. Her research on the long-term impacts of the 1989 *Exxon Valdez* oil spill in one fishing community in Alaska is a case in point. That 11-million gallon spill, the largest in history prior to the 2010 BP *Deepwater Horizon* blowout and oil spill in the Gulf of Mexico, was a catastrophe that had far-reaching consequences not only for the environment, marine life, and fisheries but also for the affected communities. Lawsuits seeking damages from Exxon dragged on for more than twenty-five years, during which the residents of the affected communities were under significant psychological and financial stress and the social fabric became frayed. Attitudes and behaviors associated with social capital, such as dispositions toward trust and goodwill, the willingness to socialize, and feelings of efficacy, declined.

Other researchers who have studied technological disasters also contend that those kinds of events, which involve blame for their occurrence, disputes over the magnitude and severity of impacts, lingering and uncertain effects, and lawsuits, can have a corrosive effect on individual and community social capital (Erikson 1995; Freudenburg 1997; Gill and Picou 1998; Picou, Marshall, and Gill 2004). For example, Mayer, Running, and Bergstrand (2015) studied the residents of four communities affected by the BP *Deepwater Horizon* oil spill and found that, even though the victims of the spill began to be compensated relatively soon after that disaster, many residents were critical of the compensation process, which they saw as random and arbitrary. As a consequence, individual claimants and businesses that had experienced losses felt as if they were in competition with one another for resources, and many avoided interactions where money-related conflicts might surface. The perception that some residents had filed fraudulent claims or profited in a major way from the spill and cleanup created feelings of distrust that also had corrosive effects. The researchers concluded that “residents felt themselves pulled apart rather than together by the claims process during what were already difficult times” (2015: 384).

A note of caution

Findings like these are consistent across a range of studies but, as I have argued elsewhere (see Tierney, Lindell, and Perry, 2001; Tierney 2014, 2018), framing technological disasters as uniquely corrosive glosses over some important points. While some researchers focus on toxic emergencies that result in diminished social capital, others point to situations in which communities have responded to such threats with apathy and denial. For example, Auyero and Swistun (2008) studied an Argentine shantytown called Flammable that is literally located on top of a toxic industrial site. They found that, even though residents suffered a number of health problems, they were doubtful and confused about whether the toxic exposure was harmful, denied the hazard, or blamed their illnesses on sources other than industrial pollution. Gunter, Aronoff, and Joel (1999) studied communities where toxic

contamination was present and found in them complacency and an absence of conflict. Kari Norgaard (2011) studied a community in Norway where residents could find evidence of climate change all around them but still engaged in collective climate change denial. Findings like these indicate that, although the literature is replete with studies showing that toxic hazards can lead to community conflict and social capital losses, there can be exceptions.

The downside of social capital

Discussions so far have focused on the ways in which social capital contributes to disaster resilience, but the effects of social capital are not always positive. After all, criminal gangs and mafias are characterized by strong social bonds too. Aldrich (2012) refers to social capital as “Janus-faced”—that is, as a set of resources and capacities that can be used for good or ill. Pioneering researcher Alejandro Portes (1998) provided various examples of what he termed “negative social capital,” including ethnically based business monopolies that keep out competitors and groups that control unions and succeed in denying membership to those considered undesirable (typically people of color). He also noted that close-knit groups and communities can exercise strong pressure toward conformity, stifling individual freedom, and that strong ties can pressure group members to remain in deviant lifestyles associated for instance with drug dealing and gang involvement even though they would rather quit. We need to keep in mind that Bourdieu’s original interest in social capital centered on how it functioned as a means of distinguishing higher-class “haves” from lower-class “have-nots.” For him, social capital was just as much about being able to exclude others as it was about creating in-group solidarity.

Along those same lines, with respect to hazards and disasters, there are a number of examples of how the strong social capital of some groups works to the detriment of others. The environmental justice literature is full of examples of how well-off and well-connected—and typically white—communities succeed in avoiding “environmental bads” such as chemical factories and hazardous landfills, pushing them onto minority communities. When groups with high social capital organize behind the banner of “not in my backyard” (NIMBY), they ensure that environmental bads are thrown into someone else’s backyard; and this “someone else” is, typically, a vulnerable group deprived of the capacity and political power to resist.

Daniel Aldrich provides examples of how the strong social capital of some groups can result in the exclusion of others. In a study of the recovery of villages and hamlets in Tamil Nadu, India after the 2004 tsunami (Aldrich 2011), he found that local councils, which had strong bonding social capital, were able to link to external sources of aid such as humanitarian NGOs and higher levels of government. However, he also found that, once those councils obtained recovery resources from the outside, they distributed them in ways that excluded certain groups within the community, such as women (especially female heads of households), elderly residents, and Dalits—members of the lowest caste, formerly known as “untouchables.” Communities that did not have local councils received less aid and had difficulty recovering, but at least they had bonding social capital, often in the form of kinship networks, and the aid that was obtained there was distributed more equitably.

The devastation wrought by Hurricane Katrina in New Orleans created a desperate need for temporary housing, and the solution FEMA devised was to provide trailers and trailer parks for displaced residents who remained in the city. A preliminary list of approved sites was developed, and final siting decisions were made by the New Orleans city government. Working with a database of 114 zip codes in and around New Orleans, Aldrich and Crook (2008) documented the number of trailers and trailer parks that actually ended up being located in each zip code. They then looked into the extent to which social capital played a role in where trailers were placed. Using voting rates in the 2004 presidential election as a measure of social capital (because voting rates were closely associated with other forms of civic participation) and controlling for a number of other variables (among them race, income, education, and flood damage), they found that the higher the voting rates in a zip code, the fewer trailers and trailer parks were located in that zip code. Trailers and trailer parks, along with those who live in them, generally come with a certain stigma and are often targeted for NIMBY actions. The authors interpreted their findings as an indication that city leaders were consciously trying to avoid neighborhoods where civically engaged residents were likely to organize in order to resist the siting of trailers.

In September 2013, communities in Colorado's Front Range region experienced massive flooding in what became the costliest disaster in the state's history. Located at the confluence of two rivers, the community of Lyons experienced extensive damage, especially to its infrastructure systems, and the entire town had to be evacuated for a time. Two mobile home parks that had housed mainly low-income and elderly residents were essentially destroyed. Housing costs were already high in the town, a significant proportion of the housing stock was destroyed in the flood, and rents subsequently went up, making it difficult for displaced mobile home residents to return to Lyons. Local advocates of affordable housing and their allies banded together, conducted studies, and developed a proposal for building a sixty-six-unit affordable housing development on six acres of a twenty-five-acre public park. The plan had strong community support, but an opposition faction emerged. That faction, which had backing from major business leaders in the town, claimed to be motivated by the need to preserve parks and open space; but there was also a strong undertone of NIMBYism. An election was held to determine whether the affordable housing development could go forward, and the measure failed. This led to the long-term displacement of mobile home residents who had been flooded out. Sociologist Nnenia Campbell (2016), who studied the aftermath of the flood in Lyons and other communities, noted that, while social capital was high among groups on both sides of the issue, housing advocates were no match when it came to their opponents' economic and political power. Observing that the controversy resulted in bitterness and recriminations on both sides, she also cites the case as an example of the corrosive effects of disasters.

Daly and Silver (2008) point to other problematic aspects of the concept of social capital. They note that the World Bank has embraced the concept and has argued for its importance in economic development and good governance; but they also point out that in the Bank's framing women and the poor are expected to generate social capital as a way of solving their own problems, while the state is assigned a lesser role. These authors express concern that

“social capital can provide a rationale for the state to exit poor communities and leave the problem-solving to civil society or individual action” (2008: 553). I will return to this idea later (pp. 210–14), when I discuss critiques of the resilience concept.

Measuring Disaster Resilience

A focus on resilience and its dimensions leads logically to questions about resilience measurement. If improving resilience is a goal, how do we know whether communities and societies are reaching that goal? Which aspects of resilience are functioning well, and which ones need improvement? Do specific elements of resilience need to be prioritized? What baseline data are available that would enable researchers to measure changes in resilience in the aftermath of disasters? Measurement strategies are needed to answer questions like these. The literature on individual, organizational, community, and national resilience is vast. In this section we will consider measurement approaches that explicitly address disaster resilience, as opposed to resilience in general, although the two concepts are obviously related.

When so much attention is being paid to disaster resilience in both research and practice communities, it is not surprising that measurement approaches have also proliferated rapidly. Schipper and Langston (2015) analyzed eighteen sets of indicators that measure resilience at different levels of analysis, some of which focus on disaster resilience. Stevenson et al. (2015) discuss thirteen different resilience assessment frameworks. Cutter (2016) reviewed twenty-seven different measurement schemes that address different resilience domains and units of analysis. Sharifi (2016) identified thirty-six different assessment tools at different analytic levels. The Resilience Measurement Evidence and Learning Community of Practice (2016) has compiled an inventory of thirty-nine resilience measurement approaches and frameworks. These comparative analyses are a good source of information on the details, strengths, and weaknesses of different approaches. Important to note is that, while there is some degree of convergence on key concepts associated with resilience across measurement schemes, concepts are operationalized differently, and at this point there is no general consensus on how disaster resilience should be measured. Frameworks and approaches also vary in terms of the hazards they take into account. Some frameworks, like the three community resilience assessment tools discussed below, are not specific with respect to the hazards considered, or take an all-hazards approach. Others focus on resilience in the face of particular hazards, such as droughts and floods, or on specific dimensions of social life, such as livelihoods and food security.

Measurement approaches can be distinguished in a number of ways. Disaster resilience is a multilevel concept; the resilience of nations, regions, economic sectors, communities, organizations, households, and individuals can all be assessed, which means that measurement schemes should focus on various levels of analysis. A nation as a whole may score one way on resilience criteria, while lower-level social units may score differently. Frameworks can be primarily quantitative or more qualitative. Another aspect on which resilience measurement schemes differ is whether they rely on “objective” data—that is, data that employ social indicators or other objective measures—or on self-reported data or self-

assessments. Examples of the latter could include data collected through focus groups and community discussions organized around the concept of resilience, where the perceptions of community members are emphasized. Cutter (2016) makes several further distinctions. Measurements can involve indices made up of quantifiable indicators or variables; scorecards involving assessments of progress toward resilience goals using numerical scores or letter grades; mathematical models of resilience such as those used by economists; or toolkits that provide step-by-step guidance on developing resilience scores. Further, frameworks can either be tailored to focus on individual communities using locally available data or be designed to allow for comparisons across multiple units such as countries or cities. Without attempting to be exhaustive, here I will focus on a few examples of sociologically relevant resilience measurement approaches of different types, with the goal of providing a general sense of the logics that undergird different frameworks and the types of indicators that are employed. The discussion focuses first on measuring resilience at the community level, then moves on to organizational- and household-level measures.

Community-Level Measurement Frameworks

Baseline resilience indicators for communities (BRIC)

Like the Social Vulnerability Index (SOVI), which was discussed in the previous chapter, BRIC was developed by Susan Cutter and her colleagues (Cutter, Burton, and Emrich 2010; see also Cutter, Ash, and Emrich 2014) at the Hazards and Vulnerability Research Institute. BRIC is a composite measure of inherent disaster resilience comprised of variables drawn from secondary sources such as the US Census and other less costly and widely available data sources. The conceptual framework on which BRIC is based is called the “disaster resilience of place” (DROP) model (Cutter et al. 2008). The unit of analysis is the community, or more specifically the county. BRIC focuses on six resilience domains, also referred to as capitals: social, economic, housing and infrastructure, institutional, community, and environmental. Within each of those domains, multiple variables were selected for inclusion on the basis of findings in the disaster research literature—forty-nine variables in all. For example, the concept of social resilience is measured by variables associated with equality in educational attainment, English language competence within the population, food security, fewer elderly and disabled residents, and the extent to which transportation, telephone service, health insurance, and mental health services are available. The community capital dimension of resilience is made up of variables indicative of place attachment, political engagement, other dimensions of social capital, and residents’ disaster preparedness and response training. Institutional resilience is measured by variables related to investments in disaster mitigation, flood insurance coverage, the ability of jurisdictions to coordinate with one another, and disaster experience. Because data are available for all counties in the United States, BRIC allows researchers and decision makers to make cross-county comparisons and to judge how their communities stack up against others. Details of the BRIC framework, including lists of indicators, can be found in Cutter, Burton, and Emrich (2010).

Communities advancing resilience toolkit (CART)

CART is a comprehensive set of resilience assessment and improvement tools that was developed by a group of researchers based primarily in the Terrorism and Disaster Center at the University of Oklahoma; the Geisel School of Medicine at Dartmouth University and the National Center for Post-Traumatic Stress Disorder; and the US Centers for Disease Control and Prevention (Pfefferbaum et al. 2013). The conceptual framework that underpins CART derives from theory and research findings on community capacity and competence from the fields of social psychology, community psychology, and public health. One of the initial publications that laid out this resilience framework was Norris et al. (2008), which was discussed earlier in connection with resilience domains. CART is meant to be applied at the community level, where “community” can also be defined as a neighborhood or some other unit of analysis; participants in the CART process are the ones who decide what the community boundaries are. A core element of the CART assessment, in contrast with that of BRIC, is based on data provided by community stakeholders who take part in a resilience assessment process. Like BRIC, CART uses widely available secondary data sources such as the census (for population, housing, and other community characteristics), the Department of Health and Human Services’ Community Health Status Indicators, and other community-level indicators that give a snapshot of community resilience capacities. In this measurement process, the community itself also collects what it considers to be relevant data through strategies such as key informant interviews and what the CART developers call “community conversations.” In addition to instructions on how to conduct interviews and community conversations, other components of the toolkit are guidance on stakeholder analysis, capacity and vulnerability assessment, and participatory strategic planning aimed at enhancing resilience.

Although its core concepts and assumptions remain the same, CART has evolved over time in terms of what the research group considers key elements of resilience and how they can be measured. An earlier formulation (Pfefferbaum et al. 2007) specified seven elements that the literature identifies as important for resilience: connectedness, commitment, and shared values; participation; support and nurturance; structure, roles, and responsibilities; resources; critical reflection and skill building; and communication. Further refinement prompted the CART group to reduce these concepts to five: general community resilience; connection and caring; resources; transformative potential; and disaster management. The assessment process involves collecting extensive data in these five areas. Listed below are examples of the interview questions that are associated with each area.

- **GENERAL RESILIENCE:** Does the community help people in need? What resources are available for disaster and terrorism readiness, response, and recovery?
- **CONNECTION AND CARING:** Do community members share similar values? Are members committed to the well-being of the community?
- **RESOURCES:** Are disaster response and recovery services available in the community? Are they available to *all* community members?

- **TRANSFORMATIVE POTENTIAL:** Does the community have or collect information in order to improve its ability to adapt and learn from crises? Are members able to take part in problem-solving regarding community issues?
- **DISASTER MANAGEMENT:** What does the community do to prevent disasters and terrorism? Is the community currently doing anything to improve its disaster/terrorism response?

Full details of the CART toolkit are available online (https://www.oumedicine.com/docs/ad-psychiatry-workfiles/cart_online-final_042012.pdf).

Disaster resilience scorecard for cities

This assessment tool was developed by the UNISDR to enable communities to assess their progress toward the “ten essentials for making cities resilient” identified in the Sendai Framework for Action. Different versions of the tool can be used for preliminary assessments, developed through short stakeholder workshops, as well as for more detailed resilience assessments, which would involve longer stakeholder engagement. The detailed tool contains 117 indicators, each measured on a scale of zero to five, covering ten major sets of activities that map onto the “ten essentials.” The scorecard enables cities to assess their overall resilience and also to identify areas in which they are performing well and areas that need improvement. [Table 7.1](#) lists the activities scored in the detailed assessment and provides examples of positive indicators for each.

There are many other measurement frameworks that attempt to assess resilience at the city or neighborhood scale. Examples include the Community Disaster Resilience Scorecard, which was developed at the Torrens Resilience Institute at Flinders University, Australia (Arbon et al. 2016), the Rockefeller-supported *City Resilience Index* (Arup 2015), the GOAL’s (2015) *Toolkit for Measuring Community Disaster Resilience*, material on conceptualization and measurement provided by the Community and Regional Resilience Institute (www.resilientus.org), and draft community resilience indicators developed by the Mitigation Framework Leadership Group (Federal Emergency Management Agency 2017).

Table 7.1 Scorecard activities and selected indicators.

SOURCE: Compiled from data in United Nations International Strategy for Disaster Reduction (2017).

Resilience Essential	Examples of Indicators
Organize for resilience	City plan incorporates risk considerations; stakeholders are included and kept up to date on plans
Identify, understand, and use current and future risk scenarios	Comprehensive risk analyses, updated in last three years and approved by a third party; risk assessments include socioeconomic, spatial, physical, and environmental assets at risk, estimated from most probable and most severe scenarios
Strengthen financial capacity for resilience	Dedicated responsibility within city to access national and international resilience financing; budget for resilience measures exists, is adequate, and is protected
Pursue resilient urban development	No loss of employment from “most severe” disaster scenario; systematic use of design solutions to improve city’s resilience, enforced by codes
Safeguard natural buffers to enhance the protective functions offered by natural ecosystems	Critical ecosystem services are identified and monitored annually using key performance indicators; city undertakes transboundary assessments of ecosystem assets and works with neighboring jurisdictions to manage assets
Strengthen the institutional capacity for resilience	Disaster risk reduction stakeholders have memoranda of understanding with relevant NGOs; there are systematic hazard-related public information campaigns using multiple media platforms
Understand and strengthen societal capacity for resilience	In every neighborhood, organizations exist that address the full spectrum of resilience issues; all vulnerable groups confirm that they are regularly engaged in disaster resilience issues
Increase infrastructure resilience	Protective infrastructure is in place to deal with “most severe” disaster scenario with minimal social and economic impacts; no loss of electrical power, even in “most severe” scenarios
Ensure effective disaster response	Comprehensive plans exist in relation to scenarios, and they have been tested in actual emergencies; equipment and relief supplies are defined in relation to scenarios and take into account the use of volunteers
Expedite recovery and “build back better”	Comprehensive plans exist for economic, infrastructure, and community recovery under “most probable” and “most severe” disaster scenarios; stakeholders are involved in “build back better” planning

Organizational-Level Measurement of Resilience

The literature on organizational resilience mainly focuses on business enterprises, as opposed to other types of organizations. Many lessons regarding organizational resilience are based on case studies of businesses that have coped and adapted in the face of extreme events (see for example Sheffi 2005, 2017). In contrast with the case study approach, other researchers have developed resilience metrics similar to those discussed above with respect to communities, and these make it possible to assess the resilience of organizations. Other insights on what makes organizations resilient come from post-disaster surveys involving large numbers of businesses. Additional insights on organizational resilience come from research carried out by economists and from bodies that produce standards and engage in resilience assessment.

Resilience measurement for organizations

Resilient Organisations, a research and consulting enterprise based in Christchurch, New Zealand, has developed and implemented a web-based survey questionnaire that enables organizations of all types to measure their resilience (Stephenson, Vargo, and Seville 2010; Lee, Vargo, and Seville 2013). In developing survey items, the Resilient Organisations team drew on several lines of research: studies on organizations that use risky technologies that exhibit nearly error-free performance, research on organizational failures, and inductive research on New Zealand organizations that experienced crises. The survey tool focuses on four main areas: the organization's resilience ethos; situation awareness; management of what is termed "keystone vulnerabilities," or parts of an organization's system that could cripple the whole organization if they failed; and adaptive capacity. The team developed multiple indicators in each of these areas, in the form of statements with which those taking the survey could agree or disagree on a Likert scale. The sum of these items is an overall resilience score. [Table 7.2](#) lists some of these statements, as outlined in one of the group's research papers (Lee et al. 2013).

On the basis of an extensive review of the literature on organizational performance in crises, Somers (2009) developed a tool called the Organizational Resilience Potential Scale (ORPS), which was designed to measure what he terms "latent resilience"; and he tested the tool using a survey with a sample of municipal public works managers. Managers were asked to rate their departments on the following factors: goal-directed solution seeking; risk avoidance; critical situational understanding; ability of team members to fill multiple roles; reliance on information sources; and access to resources. Information was gathered on six additional measures: managers' risk perceptions; decentralization of decision making, which is believed to be related to an organization's capacity to respond in crises; extent of continuity of operations planning; managerial information seeking; whether the department had outside accreditation; and the department's involvement in community planning.

Table 7.2 Resilience measures developed by Resilient Organisations.

SOURCE: Compiled from data in Lee, Vargo, and Seville (2013).

Resilience Component	Examples of Survey Items
Resilience ethos	Our organization has a culture where it is important to make sure that we learn from our mistakes and problems. Our organization is able to collaborate with others in our industry to manage unexpected challenges.
Situation awareness	Our organization has clearly defined priorities for what is important during and after a crisis. Our organization is able to shift rapidly from business as usual mode to respond to crises.
Management of keystone vulnerabilities	I believe our organization invests sufficient resources in being ready to respond to an emergency of any kind. Our organization understands that having a plan for emergencies is not enough and that the plan must be practiced and tested in order to be effective.
Adaptive capacity	People in our organization are known for their ability to use their knowledge in novel ways. There is an excellent sense of teamwork and camaraderie in our organization.

Extrapolating from post-disaster business studies

Although not carried out under the rubric of resilience or specifically for measurement purposes, much of my past work has focused on challenges that businesses experience in disasters and on factors that are predictive of positive short-term and long-term business recovery outcomes (see Dahlhamer and Tierney 1998; Webb, Tierney, and Dahlhamer 2000, 2002; Tierney 2007). Those studies had the advantage of employing stratified random sampling methods, as opposed to the methods used in case study approaches, and this made it possible to generalize findings across larger populations of businesses. That body of research led to insights into the pre-disaster characteristics and post-disaster experiences of businesses that tended to fare better than others in the aftermath of disasters—which is one way of thinking about business resilience. One weakness of my research on businesses and disasters was that the samples were limited to businesses that had survived disasters. Other research that also used stratified random sampling methods focused on both surviving businesses and businesses that collapsed after a disaster—in this case, Hurricane Katrina (Marshall, Niehm, Sydnor, and Schrank 2015; Sydnor et al. 2017). Researchers have also employed qualitative methods to delve more deeply into factors that are associated with positive post-disaster outcomes (Alesch, Holly, Mittler, and Nagy 2001); or they have used a combination of quantitative and qualitative approaches (Hall, Malinen, Vosslander, and Wordsworth 2016).

Findings across studies are not entirely consistent, but they do help identify what makes businesses vulnerable to poor recovery outcomes following disasters and to suggest business resilience factors.

Generalizing from these and other, similar studies, we can hypothesize that business disaster resilience is linked to four sets of factors: business characteristics, owner characteristics, disaster impacts, and exogenous economic conditions. Regarding business characteristics, in line with sociological research on organizations, being a large business in terms of number of employees and revenues appears to make those businesses more resilient than small ones. Business type is also important; businesses in economic sectors that are highly regulated, such as financial institutions, are generally more resilient because they are required to be, while businesses in highly competitive sectors where there are higher rates of failure during non-disaster times, for instance in the retail and service sectors, are likely to be more at risk for failure or poor recovery outcomes. Businesses that are involved in post-disaster repair and reconstruction, such as construction companies and hardware stores, may fare better after disasters, with the caveat that those gains are, typically, temporary. Being located in a structure that is owned rather than rented appears to add to resilience. Older businesses, as opposed to recently established ones, appear to be better able to weather stressors brought on by disasters. There is also some evidence that partnerships and other ownership forms, as opposed to sole proprietorships, are more resilient. Businesses that were faring well financially before disaster struck also appear to register more positive outcomes. Finally, there is some evidence that businesses that serve a wide market outside the disaster impact area—for example, by having an Internet sales component or by placing their goods in stores in multiple locations—may have fewer difficulties than businesses with a local focus only, because disasters can create problems with access to businesses or can alter customer behavior.

With respect to business owner characteristics, being male and not being a member of a minority group appear to be associated with greater resilience. Women- and minority-owned businesses tend to have fewer economic resources, which makes them more vulnerable to experiencing difficulties in the aftermath of disasters. The educational attainment level of the business owner is another resilience factor, indicating that an owner's social capital plays a role in business resilience. Resilience is higher when owners have more industry experience and more disaster experience, and there is also an indication that an owner's flexibility, capacity for innovation, and entrepreneurial spirit matter for business recovery.

Disaster impacts are also important for understanding business resilience. Other things being equal, businesses are less likely to be able to cope when disaster damage to structures, inventories, and equipment is very severe and when disruptions of infrastructure services such as electrical power and communications are prolonged—both of which can lead to business closure for longer periods. When a business is located in an area that has been highly damaged—even if the business itself has not—it could face significant recovery challenges. Additionally, where there has been residential damage and dislocation, a business may be in danger of losing its customer base, and this could be especially problematic for businesses that earn their income locally.

Finally, like all businesses, those that have experienced disasters are affected by the overall economic climate and trends within their specific sectors. Generally speaking, resilience levels should be higher in good economic times than in poor ones. Positive economic conditions should favor business recovery, while recessions and periods of high unemployment (and hence less discretionary income for households) should have adverse effects. Disasters typically bring additional funds into affected regions via disaster assistance and insurance payouts, but such funds do not benefit all businesses equally.

Insights from economics

Although economists who do research on disasters tend to focus on disaster effects at the national and regional level, some economists also collect and analyze data on individual businesses. Adam Rose is an economist who has done research on economic impacts and resilience at all three levels. Rose defines and measures business resilience in ways that differ to some degree from previous discussions. He defines *static economic resilience* as the ability of a system—in this case, a business—to maintain functionality when it experiences an external shock such as a disaster. By contrast, *dynamic economic resilience* consists of actions taken to recover from a disaster or some other shock (Rose 2007). Rose also makes a distinction between *inherent* and *adaptive* resilience. Inherent resilience already exists in pre-disaster times; examples include large business inventories and other resources, or arrangements that have been made to ensure that a business can receive the supplies and components it needs even when a disaster occurs. Adaptive resilience consists of strategies that ensure continuity of business operations and recovery after disasters, for instance the ability to continue to operate on generators if the electrical power supply fails, or to relocate the business if needed. Also included in this category is the ability of a business to understand how the disaster has affected the demand for its goods and services, either positively or negatively, and to respond accordingly. Framed in this way, resilience results from a combination of pre-disaster organizational strengths and post-disaster ingenuity (Rose and Krausmann 2013).

Rose's approach to quantitatively assessing business resilience is relatively straightforward and intuitive: as a first step, think of the maximum disruption a business or some other economic unit could experience as the result of a disaster in the form of economic losses, then calculate what percentage of those losses was avoided. That percentage is a measure of resilience. Put another way, resilience is the ratio of losses avoided to potential maximum losses. Rose and his colleagues (Rose, Oladosu, Lee, Asay 2009) demonstrated this resilience metric using the example of businesses affected by the 2001 World Trade Center terrorist attack. Their focal concern was the firms' resilience in the face of business interruption. They obtained a dataset on the 1,134 firms that were forced to relocate after the attack because they had been doing business in the two collapsed Trade Center towers or the immediate vicinity. Between them, these firms employed over 100,000 people. An estimate of the losses that would result if all those businesses ceased to operate (i.e. on an indicator of zero resilience) provided the upper bound of how serious the economic impacts could be. Conversely, estimating losses if all businesses relocated immediately, never experiencing any

interruption, provided the lower bound (i.e. an indicator of full resilience). Using data on actual business interruption losses, the researchers determined that 72 percent of potential losses (the upper bound) had in fact been avoided. In their terms, then, the resilience factor for businesses was 72 percent.

Rose's reasoning provides a means of looking at organizational resilience beyond the private sector, with some modifications. For example, without being too simplistic, we can think of the resilience of a hospital, a utility service provider, or a government agency as consisting of the services it is able to provide after a disaster measured against a hypothetical situation in which it is able to provide no services at all. Organizations could then be scored on the basis of their post-disaster performance. A hospital that experiences no decline in its ability to provide services would receive a resilience score of 100 percent, because it managed to avoid all potential disruptions. A utility company that experiences no loss of service provision to any of its customers after disaster would be rated highest on resilience, while companies that experience varying degrees of service disruption to all or to some customers would be scored lower, and so on.

Normative approaches to organizational resilience measurement

In contrast with the empirical approaches to resilience described above, normatively based strategies for assessing organizational resilience take into account how an organization measures up to consensus-based standards for organizational preparedness and crisis response or to other types of standards. Standards developed by the International Organization for Standardization, known as ISO, are widely accepted and used worldwide. A recent standard, ISO 22316: 2017, focuses specifically on organizational resilience. That standard sets out activities that indicate compliance within nine areas of organizational performance:

- shared vision and clarity of purpose,
- an understanding of the context in which the organization operates,
- effective and empowered leadership,
- a supportive organizational culture,
- shared information and knowledge,
- adequate resources,
- development and coordination of management disciplines,
- support for continual improvement,
- the ability to anticipate and manage change.

ISO has also produced a suite of detailed standards associated with risk assessment, risk management, and ensuring the continuity of business operations in the event of disruption that may arise from various sources, such as disasters and terrorist attacks. Compliance with such standards could be taken as indicative of organizational resilience.

The Insurance Institute for Business and Home Safety (IBHS), which receives funding from the insurance industry and other sources, has developed a toolkit called Open for Business (OFB) that consists of guidance aimed at ensuring business continuity after disasters, with a special emphasis on small businesses. IBHS makes this toolkit, called Open for Business EZ (OFB-EZ), available online at no cost and also provides an app that businesses can use to guide their own business continuity planning processes. OFB-EZ recommends best practices in many different areas, including risk assessment and prioritization, operations, finances, human resources, and information technology. Although not framed as a resilience assessment method, OFB-EZ could potentially be converted to one: businesses that have followed all recommendations contained in the toolkit could be given a high resilience score.

Measuring Household Resilience

By comparison with what is available for community-level measures, there are relatively few checklists or toolkits for measuring household resilience to disasters. I begin this section by discussing findings from the disaster research literature that indicate the types of factors likely to be associated with household resilience. I then move on to provide a brief overview of the extensive literature on family psychosocial resilience as it relates to disaster resilience. Finally, I consider some measures that are commonly used to assess household resilience in less developed countries.

Long before the concept of disaster resilience came to the fore, researchers conducted extensive studies on household hazard mitigation and preparedness for a wide range of disasters, as well as for terrorism (for summaries of earlier research, see Drabek 1986 and Tierney et al. 2001; see also Lindell and Perry 2000; Bourque, Mileti, Kano, and Wood 2012). Although it is difficult to generalize because study results are not entirely consistent, we can tentatively identify household characteristics that may be associated with resilience potential, just as we did with businesses. Some studies suggest that minority households are less likely than whites households to adopt mitigation and preparedness measures, and that home ownership and higher levels of income and education are associated with carrying out such measures. Households that actively seek out information about hazards are more likely to prepare, as are households that have previously experienced disasters. Perceived risk tends to be associated with the adoption of protective and preparedness measures, but generally exerts its influence in combination with other factors. Findings such as these need to be put into context: levels of household preparation for disasters are low, even in high-risk areas. Taking into account the many forms of disaster vulnerability that were discussed in the previous chapter, it is not difficult to see why many households would have difficulty coping with a disaster.

The topic of family resilience has been prominent in the psychological sciences for decades, and there are literally hundreds of models that seek to identify family resilience factors, both during normal periods and in the face of stressors (for examples, see Black and Lobo 2008; Becvar 2013; Masten and Monn 2015; Walsh 2016).¹ The vast majority of this work has focused on the psychological well-being of family members, factors associated with

psychological vulnerability, and protective factors that help family members avoid negative psychological and social outcomes such as anxiety, depression, and substance abuse. This literature focuses on stressful circumstances of all types, examples of which include illness and bereavement, crime and community violence, wars and civil wars, terrorism, and in some cases disasters. On the basis of the finds presented in this literature, Vogel and the Family Systems Collaborative Group (2017; see also Vogel and Pfefferbaum 2016) identify four sets of factors that they consider to be associated with family resilience. First, family members should possess a set of beliefs and attitudes that include seeing crises as shared challenges for the family, accepting that distress is to be expected under stressful conditions, having hope, but of the realistic sort, avoiding feelings of blame or guilt, being in touch with religious and other pro-social belief systems, and viewing adversity as a meaningful and even positive experience. Second, under stress, households that are resilient stick to their daily routines and rituals as much as possible, and adapt in situations where that is too difficult. This covers maintaining family roles, for example by ensuring that parents retain their authority. A third set of resilience factors involves communication. In resilient households, family members communicate, but in appropriate ways. For example, adults avoid giving young children more information about a disaster or a stressful situation than they can handle at their developmental level. Household members allow for the expression of a range of emotions, including negative ones, but are also able to find joy under difficult circumstances. Finally, resilient families employ a range of coping and problem-solving skills.

The Social Policy and Evaluation Research Unit (Superu) in New Zealand identifies a range of protective factors that are associated with family resilience. These include family-level factors such as good communication, a secure household income, and effective decision-making processes; family-member factors such as having positive coping skills, behavioral control, and an optimistic outlook; and community connectedness, expressed for instance in having a sense of belonging, creating opportunities for community involvement, and being part of a cohesive community. Also important is the broader community and societal context; for households to thrive, there should be policies that support families, other societal norms that promote household well-being, and a sense of cultural identity and pride (Superu 2015). This framework takes into account not only family characteristics but also the kinds of social capital attributes that were discussed earlier in connection with resilience.

Under the auspices of the United Nations Development Program, Winderl (2014) compiled and conducted a review of a number of measurement approaches and tools at different levels of analysis, the majority of which were formulated for use in less developed countries. The only household-level measurement framework he reviewed, the United Nations Food and Agricultural Organization (FAO) Resilience Index, focuses primarily on food security. The main components of that model are income and food access; access to basic services, such as health services; the existence of social safety nets; household assets; household adaptive capacity, which is reflected in factors such as the diversity of income sources; and household stability in terms of employment, income fluctuations, and the like. The FAO framework or some version of it has been used in other resilience assessments.

There are a number of other measurement frameworks that are used in assessing household

resilience in the developing world. The Secure Livelihoods Research Consortium (SLRC) is an alliance composed of researchers from eight institutions in North America, Europe, Asia, and Africa and from the United Nations Food and Agricultural Organization, whose work focuses on household livelihoods and well-being, with an emphasis on household resilience in the face of conflict. The SLRC conducted longitudinal research with households in the Democratic Republic of Congo, Nepal, Pakistan, Sri Lanka, and Uganda. Its measurement tool focuses on three main areas: livelihoods, which consists of food security, income sources, and assets; access to and experience with services, including health and education services and water access; and relationships with governance processes, including civic participation. Through its project Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED), the Overseas Development Institute in the United Kingdom has also developed a suite of instruments for assessing household resilience.

Programs for Enhancing Resilience

Recent years have seen the development of a number of programs aimed at improving resilience. In this section I focus on four such efforts: a program sponsored by the Rockefeller Foundation; resilience planning sponsored by the National Institute of Standards and Technology; activities carried out by ISET-International; and resilience measurement and enhancement efforts at the National Academies of Sciences, Engineering, and Medicine.

As its name indicates, the Rockefeller Foundation's program 100 Resilient Cities (100RC) focuses on urban resilience. This initiative began in 2014. Funding is currently provided to large and small cities on every continent except Antarctica. The program frames resilience as the capacity to respond to two types of problems or stressors that cities face. Chronic stressors, which are ongoing for cities, include problems such as high unemployment, food and water shortages, and climatic change. Acute stressors include natural disasters, disease outbreaks, and terrorist attacks. Each city is required to develop a resilience strategy aimed at reducing the impacts of both types of stressors. One of the key elements of 100RC is the funding of chief resilience officers (CROs) in participating cities. The CRO, who typically reports directly to the city's mayor, is responsible for developing a resilience vision and for bringing together city departments and authorities so that they can coordinate their resilience-related activities. Rather than working in isolation, CROs participate in a global CRO network that enables them to share information on resilience plans and activities. Another key element involves participation by dozens of "platform partners" that can assist cities in developing and implementing their resilience strategies. Partners include technology companies, consulting firms, environmental NGOs, insurance and financial entities, risk-modeling firms, and professional associations. In collaboration with Arup, a London-based consulting firm, Rockefeller developed the Community Resilience Framework, an assessment tool centered on four key elements of urban resilience: leadership and strategy; infrastructure and environment; economy and society, or social and financial systems that contribute to resilience; and health and well-being. Along with other organizations, Rockefeller is also a member of the Global Resilience Partnership (GRP), which seeks to

identify innovative resilience-building programs with a focus on highly vulnerable communities in Africa and Asia.

The National Institute of Standards and Technology (NIST) developed the *Community Resilience Planning Guide* to assist communities in assessing and improving their resilience in the face of hazards. The *Guide*, which was released in 2015, provides direction on a six-step planning process that contains the following elements (National Institute of Standards and Technology 2015a, 2015b):

- forming a collaborative planning team,
- understanding the community's social and built environment and their linkages,
- determining community goals and objectives,
- developing a resilience plan and implementation strategy,
- preparing and reviewing the plan and obtaining approval from authorities,
- implementing, evaluating, and updating the plan.

Accompanying the planning guide is a series of planning briefs that instruct communities on how to address various elements in the planning process, for instance how they can characterize their populations and social institutions, set resilience goals, and identify and prioritize resilience shortfalls. NIST also provides funding for the Center for Risk-Based Community Resilience Planning, which is a multidisciplinary consortium of researchers from twelve universities led by Colorado State University.

The Institute for Social and Environmental Transition-International (ISET) is an NGO made up of researchers and practitioners whose activities focus primarily on urban vulnerability reduction and resilience enhancement and emphasize coping and adaptation in the face of climate change and associated extreme events. Although ISET works in developed countries, much of its activity is dedicated to improving the resilience of cities in less developed countries, particularly those in South and East Asia. ISET's programs are typically undertaken in collaboration with partners that specialize in relevant areas of expertise and with local partners, the emphasis being on shared learning. Through its work as part of the Asian Climate Change Resilience Network, ISET developed the Urban Climate Resilience Planning Framework (UCRPF) (Moench, Tyler, and Lage 2011), which emphasizes understanding vulnerabilities and improving resilience in the following areas:

- **URBAN SYSTEMS:** ecological systems, critical infrastructure systems (water, power, etc.), food, shelter, energy;
- **AGENTS:** actors in local communities, including households and governmental and private sector organizations; focus on empowering agents, in particular those that are marginalized;
- **INSTITUTIONS:** norms, laws, and practices in areas such as land tenure, markets, and rights possessed by different stakeholders (agents), and decision-making processes; and

- **EXPOSURE:** the direct and indirect effects of climate change on urban systems and agents.

ISET has produced dozens of reports and guidance documents designed to help local actors understand climate change and change-related risks and to devise coping and adaptation strategies. The organization also provides training materials that lead local actors through a planning process that involves establishing basic resilience principles and understanding the UCRPF model; understanding local vulnerabilities and risks through research and stakeholder engagement; and building a resilience action plan.

The National Academies of Sciences, Engineering, and Medicine (the Academies), nonprofit institutions that provide analysis and advice on issues of societal significance in the United States, are also extensively involved in efforts to conceptualize, measure, and improve resilience. Within the Academies, there are a number of groups whose activities focus on building resilience for disasters, disease outbreaks, security threats such as terrorism, and critical infrastructure risks. Academies publications include *Building Community Disaster Resilience through Private–Public Collaboration* (National Research Council 2011) and *Disaster Resilience: A National Imperative* (National Research Council 2012). The Academies Resilient America Roundtable (RAR), which brings together experts from academia, government, and the private sector, has established pilot projects with local partners and stakeholders in four cities: Cedar Rapids Iowa, Charleston South Carolina, Seattle Washington, and Tulsa Oklahoma. Another aspect of RAR is concern with resilience measurement.

Resilient Disaster Responses

As noted earlier in discussions on the history of disaster research, the field began with the study of disaster responses, and the focus on that phase of the hazards cycle remains vital. That research tradition gives many insights into conditions associated with resilient responses to disasters. In its National Response Framework (NRF), the US Department of Homeland Security (2013) calls for responses that are flexible, scalable, and adaptable—and disaster researchers would agree. These three qualities are seen as important for a variety of reasons. Response operations must be flexible enough to cope with emergencies of different types and sizes and should begin at the local community level; higher-level governmental jurisdictions should join when needs that cannot be met or resources that do not exist at the local level have been identified. Disasters are always dynamic; rather than being discrete events, they *unfold* and new problems invariably emerge. For example, earthquakes can cause tsunamis, landslides, hazardous materials releases, and even nuclear plant emergencies and nuclear emissions, as was seen in Japan in 2011. Flooding also spreads hazardous substances and gives rise to health problems such as toxic mold and waterborne bacteria. Response activities must address the complexities of disasters and be adaptable in the face of changing circumstances. As researcher John Harrald (2006) has pointed out, responding to disasters requires discipline; but it also requires agility.

The Department of Homeland Security also emphasizes that the NRF is a document and a set of principles that can be used by the “whole community”; they guide its response, and, specifically, call for participation not only from governmental agencies but also from the private and NGO sector, for instance from groups of NGOs such as the National Voluntary Organizations Active in Disasters (NVOAD), which exist in many communities. The intention here is to move away from a government-centered approach to a broader one, which incorporates capacities outside government. The NRF also stresses that the needs of vulnerable groups such as children, persons with disability, and non-English speakers should be addressed—that is, disaster responses should be inclusive.

The NRF is not without flaws. For example, it specifies that all organizations that become involved in disasters should use the incident command system (ICS), a specific way of organizing response activities that was developed in the 1980s for responding to wildfires and codified into law after the September 11, 2001 terrorist attacks. The ICS identifies five activities as central to disaster responses: command, operations, planning, logistics, and finance. While it is important that responding organizations and groups have a good sense of how they should operate in a disaster, many will not use the ICS as a means of structuring their activities. The ICS may be rejected as incompatible with the cultures of some organizations, such as NGOs. As discussed in more detail in what follows, disasters inevitably involve actors that emerge spontaneously and that were never involved in pre-disaster planning or training. In other words, responding groups and organizations may not even know that ICS exists. Given the nature of disaster responses, it is essentially impossible to require adherence to a single organizational model (for more discussion, see Kendra and Wachtendorf 2016).

Resilient disaster responses are nonhierarchical. Decisions are made at the appropriate level—usually that of the local incident—and by those who are closest to emerging problems. While responses require coordination, they do not require centralized command. The response to the 1995 Kobe earthquake was slower than it needed to be because local authorities were waiting for the prefectural governor to give orders, while the governor, who was initially unreachable, was waiting for orders from the central government in Tokyo, which were slow in coming. The US Coast Guard is frequently lauded for its performance in disasters, and that is largely because that organization emphasizes a principle of on-scene initiative. Those in charge of vessels do not wait to be told what to do; they take action on the basis of identified needs (Tierney 2014). As disasters unfold, there are always people who lament the fact that it looks as if no one is in charge and who complain about “chaos.” Wanting a centralized structure or a “command and control” model of response flies in the face of what decades of disaster research tell us, namely that disasters are complex and multifaceted, requiring diverse sets of expertise, and that hierarchy is the enemy of rapidity and adaptability.

Along these same lines, resilient responses are able to accommodate emergence. As discussed in [Chapter 4](#), emergent groups are always a part of the response landscape. Organizations may expand in size and may take on tasks they normally do not perform, and volunteers may converge. To focus again on lessons from the Kobe earthquake, hundreds of

thousands of people offered volunteer services of all kinds to those in the affected region, but local authorities had difficulty working with volunteer groups. Reasons for their exclusion included Japan's state-centered view of society and its general suspicion of voluntary organizations. In the aftermath of the earthquake, 1995 was referred to as "the first year of the volunteer," VOADs were formed, and laws were changed to make it easier for voluntary groups to function (Tierney 2012).

EMONs are also an invariant feature of disaster responses. Organizations typically cluster around problem-solving tasks, many of which are unique to specific disasters. For example, sociologist Christine Bevc (2010) studied the EMON that developed during the emergency period that followed the terrorist attacks on the World Trade Center in 2001. That EMON consisted of at least 700 different public, private sector, and nonprofit organizations as well as of newly emergent entities, all of which were organized around 42 different tasks. Some of those tasks, such as caring for those who were injured, were typical tasks that are performed in disasters, while others, for example investigating the rubble from the towers as a crime scene, were not typical. Some organizational entities rose to prominence unexpectedly by taking on roles that were not specified in disaster plans, because particular activities were necessary. The Trade Center response was typical of what happens in large-scale disasters.

Butts, Acton, and Marcum (2012) studied EMONs that developed during warning and emergency periods in the multistate area that was struck by Hurricane Katrina. They identified 187 distinct networks that clustered around different tasks and changed over time. Regarding how organizations coordinated their activities, they noted that

coordination roles in the inner core of the Katrina EMON appear to be filled by a combination of organizations with a standing mandate to bridge diverse groups and organizations whose centrality emerges from tasks and resource considerations that are peculiar to the specific event. (Butts et al. 2012: 25)

Disaster planning seeks to identify and address problems that could emerge during disasters, but disasters always contain an element of the unexpected. This is one of the reasons why emergence is so common. A resilient disaster response is flexible enough to incorporate groups that were not identified in prior planning.

As discussed earlier in [Chapter 4](#), scholars have pointed to the role of improvisation in disaster response (Weick 1998; Kendra and Wachtendorf 2003, 2006; Wachtendorf 2004; Mendonça and Wallace 2007). Because disaster impacts cannot be planned for in totality, disasters almost always create problems that were not envisioned in the original plan. Like jazz pianists and improvisational actors, responders must depart from scores and scripts in order to put together an effective performance. Let us return to the World Trade Center attacks. The Mayor's Office of Emergency Management (OEM) in New York was located in one of the buildings of the World Trade Center complex—a building that caught fire and collapsed on the afternoon of September 11. Surprisingly, the OEM did not have a backup site from which to coordinate emergency operations, which forced the organization to improvise an emergency operations center (EOC) in the middle of a major crisis response. After moving to different locations and not having enough room for all the organizations and

personnel that were taking part in the response, the OEM reestablished the EOC in one of the massive piers that line the Hudson River on the west side of Manhattan. The pier accommodated both the entities that had been involved in pre-disaster planning and other organizations, which joined the response team for specific purposes, such as producing maps to show damaged areas and assistance sites, since the OEM had lost its map-making capabilities (Wachtendorf 2004).

Approximately 1 million people were in Lower Manhattan at the time of the attacks, and the subways and trains were not operational. Many people walked uptown and over the Brooklyn Bridge to get home, but an estimated 300,000 people were evacuated by water by means of a spontaneous, improvised system that brought together ferries, tugboats, fishing boats, dinner boats, sightseeing vessels, government watercraft, and other types of vessels. Mariners saw the need that day; they understood the waterways around Manhattan like no one else, so they immediately began a process of self-organizing (Kendra and Wachtendorf 2016). Similarly, in the aftermath of Hurricane Katrina, private boat owners spontaneously organized what they called the Cajun Navy and headed to New Orleans to rescue people who had been trapped by the floodwaters. Some of these same boat operators left Louisiana to perform rescues after Hurricane Harvey in 2017.

Improvising response activities does not mean making up those activities out of whole cloth. Just as students of jazz view improvisation as the outcome of mastering many musical forms, students of disaster responses see improvisation as arising from previously acquired knowledge. In New York, members of the OEM staff had a mental picture of how the EOC needed to be organized and what groups needed to participate. At the same time, they were anxious to make room for new players who had resources and skills to offer. Boat operators had a thorough understanding of the waters surrounding Manhattan, but they also found creative ways of identifying who needed to go where and of labeling origins and destinations in ways that evacuees could understand. As these examples show, improvisation involves retaining pre-disaster knowledge when it makes sense to do so while also using ingenuity to tackle unexpected challenges.

Continuing with this theme, those who are involved in responding to disasters must know that they can and should improvise and adapt when the situation calls for it. Organizational practices that confine actors to narrow roles and responsibilities and want things done “by the book” discourage improvisation. Organizational scholars point to conditions that increase the likelihood that disasters can be averted and, when they happen, are managed well. Such conditions include extensive experience on the part of organizational actors; diversity in terms of competencies, experiences, and perspectives; and effective communication among actors. Organizational scholars also point to the importance of nonhierarchical relationships within organizations, such that lower-level staffers know that they have permission to speak up when they see anomalies or signs of impending disaster (Weick and Roberts 1993; Weick, Sutcliffe, and Obstfeld 1999; Sutcliffe and Vogus 2003). Resources are also important. Schulman (1993) refers to the importance of “resource slack,” that is, personnel, funds, and material resources that exist over and above what an organization needs for its daily operations and can be rapidly accessed should the need arise. If organizations do not possess

those resources themselves, they should have easy ways of obtaining them, which is one reason why various types of mutual aid pacts—for example, among police departments, utility companies, and states—are common in emergency management. Similarly, health and public health organizations have devised ways of increasing their surge capacity in disasters and other emergencies, for instance disease outbreaks.

Resilient disaster response involves anticipating disaster impacts on the built environment and exposed populations while also expecting the unexpected. Pre-disaster hazard assessments, impact and loss estimates, scenarios, and policies designed to identify specific vulnerabilities and vulnerable groups help communities understand the likely consequences of different types of disasters. A knowledge-based planning process increases the chances that the community will be able to respond effectively. At the same time, community leaders and those charged with carrying out response activities should take a critical stance and question their assumptions, both about impacts and about their own response capabilities. What if hazard assessments are based on outdated science? What if community vulnerability analyses overlook important population changes? How current (or outdated) are the resource lists kept by emergency management organizations?

Along with the need to base response plans on sound information, outside-the-box thinking is also required. What if some impacts that have been envisioned do not materialize, but other unanticipated impacts occur? Will the response system be flexible enough to deal with those impacts? Do entities that are planning to respond have significant blind spots, and could they benefit from seeking out external and dissenting perspectives? Regarding the earthquake–tsunami–nuclear-plant meltdowns in Japan in 2011, for example, there was evidence that a major earthquake that occurred hundreds of years ago in the same region had generated a gigantic tsunami, but that information was overlooked by emergency planners. Similarly, Tokyo Power Company, which owned and operated the Fukushima nuclear plants, had been informed that the plants could be disabled by a very large tsunami but did not take steps to enact countermeasures. In the absence of these kinds of blind spots, the catastrophic losses that resulted might have been averted.

Relatedly, disaster response organizations should be learning organizations. They should learn from the disasters they experience, from the experiences of other communities, and from drills and exercises. One reason why after-action reports are developed after disasters and exercises is to identify lessons learned. Equally if not more importantly, however, in order to be resilient, response organizations must incorporate those lessons into their procedures and practices. Sadly, organizations and communities have a tendency to content themselves with pointing out lessons learned and areas in need of improvement, without adapting or changing.

Resilient Disaster Recovery

Although progress has been made in the past few years, recovery remains the least studied of the stages of the hazards cycle—a carryover from the days when disaster response was

receiving the lion's share of research. Although not enough is known about disaster recovery processes, researchers—particularly those from the urban planning discipline, but also from sociology—are able to point to factors that predict positive recovery outcomes, which is one way of conceptualizing resilience. Earlier discussions of resilience have focused to some extent on recovery, for example by homing in on conditions that appear to be associated with either positive or negative outcomes for households and businesses. Here we focus on factors that influence community disaster recovery.

Disaster recovery is “the differential process of restoring, rebuilding, and reshaping the physical, social, economic, and natural environment through pre-event planning and post-event actions” (Smith and Wenger 2007: 237). Several aspects of this definition are important to note. First, recovery is differential in the sense that different aspects of disaster-stricken communities recover at different rates, as do different social groups. Second, recovery should be thought of as a process or series of processes, not an end point; and, particularly in cases where disaster impacts are severe, such processes can go on for years, or even for decades. Third, recovery is complex, encompassing multiple aspects of community life. [Text Box 2](#) lists just a few dimensions and domains in which recovery processes operate. As the definition above and the items in the list indicate, disaster recovery involves much more than physical reconstruction and includes social, psychological, cultural, and institutional dimensions.

If we focus on this short list of recovery domains, it is evident that many dimensions of recovery are interdependent and that some aspects of recovery assume priority. For example, it will be difficult to restore housing if major utilities such as power and water are unavailable; and it will be difficult to restore neighborhoods without homes, schools, and businesses. Similarly, lost jobs and economic activity will not be able to recover unless businesses can reopen; businesses also depend on the availability of utilities and buildings from which to operate, and they need transportation systems to be restored, so that they can receive shipments and customers can reach them. Additionally, transportation systems must be functional and ensure that the supplies needed to repair and rebuild public, commercial, and industrial buildings are available. Household quality of life, psychological well-being, community spirit, and cultural recovery all depend, at least to some degree, on the restoration of the built environment and on the recovery of key community institutions. Researchers have begun to explore these interdependencies through modeling and simulation, with an eye on identifying which pre-disaster measures (e.g. utility-system mitigation measures) and post-disaster actions (e.g. rapid debris removal, utility-system restoration) contribute to better, more resilient recovery outcomes (Miles and Chang 2003, 2006, 2011). To ensure resilient recovery, those in charge of the process must understand interdependencies across domains and scales and guide recovery activities accordingly.

Text Box 2 What Needs to Recover after Disasters? Examples of Disaster Recovery Domains

Temporary and permanent housing	Household quality of life
Infrastructure: utilities, roads, etc.	Physical well-being
Public buildings	Psychological well-being
Commercial and industrial buildings	“Community spirit” and attachment
Businesses and jobs	Distinctive aspects of community culture
Disrupted economies	Environment, ecosystems, natural resources
Key community institutions: schools, hospitals, etc.	Neighborhoods

Studies of disasters in the United States and around the world have uncovered a variety of factors that encourage resilient disaster recovery. Laurie Johnson and Robert Olshansky (2016) studied recovery processes after major disasters in six different countries: the 1995 Kobe earthquake and 2011 earthquake and tsunami in Japan; the 2001 World Trade Center attacks; the 2001 Gujarat earthquake in India; the 2004 Indian Ocean earthquake and tsunami in Indonesia; Hurricanes Katrina and Rita in the United States (2005); the 2008 Wenchuan earthquake in China; the 2010–2011 Canterbury earthquake sequence in New Zealand; and Hurricane Sandy in the United States (2012). In some of those cases, such as the 2008 earthquake in China and the 2010–2011 earthquakes in New Zealand, recovery plans and policies were directed by the central government. In others, such as the Japan earthquakes, there was strong central government involvement but also ties with other levels of government. In Indonesia and India the recovery planning and management were more decentralized and balanced; there were multiple entities at different levels that coordinated their activities.

Although these disasters took place in markedly different societies with different forms of governance and systems for providing recovery aid, Johnson and Olshansky saw commonalities across the cases they studied that led to recommendations about how to achieve positive disaster recovery outcomes—what I call here resilient recovery. One key recommendation concerned the locus of recovery decision-making and direction. As we saw with disaster response, centrally controlled recovery activities have a downside. In the Wenchuan earthquake, for example, recovery was directed by China’s central State Council and aligned with governmental priorities such as urbanizing the countryside and promoting tourism, as opposed to local concerns and preferences. Rebuilding took place rapidly and entire communities were moved and rebuilt, but in most cases recovery activities were

carried out without public involvement and relatively little attention was paid to restoring livelihoods and social networks and addressing community needs. Although the political and economic conditions were different, this same pattern was seen in China following the devastating 1976 Tangshan earthquake, which destroyed 95 percent of the buildings in that city of 500,000 and killed approximately 242,000.² As in the Wenchuan case, the central government developed a recovery process for Tangshan that was consistent with its own goals, the emphasis was on physical reconstruction, and public participation was lacking (Zhang, Zhang, Drake, and Olshansky 2014).

Less centralized processes may be more difficult to manage and recovery may take longer, as more actors are involved and there is broader community participation, but the outcomes are likely to be more satisfactory. In addition to recommending that it is important to decentralize recovery decision-making and management to the greatest extent possible, build capacity, and empower the residents of disaster-stricken communities, Johnson and Olshansky (2016) offer the following recommendations:

- obtain and distribute recovery funding efficiently, effectively, and equitably;
- collect and disseminate information to all parties in the recovery process, for example by employing newsletters, websites, paid liaisons, and entities that bring together key personnel from lead agencies and the public;
- support collaboration, both horizontally (across similar types of organizations and at the same level of governance) and vertically (across scales and levels of governance);
- meet immediate, urgent needs in disaster-affected areas while thinking ahead to plan for longer-term community improvements;
- plan and act simultaneously; take actions that are feasible right away while still paying attention to situations that need longer-term deliberation;
- budget for the costs of communication and planning, revise budgets over time, and plan for contingencies in case things go wrong with some aspects of recovery;
- avoid the permanent relocation of residents and affected communities, except when it is clearly necessary, and then take steps to ensure full participation on the part of residents;
- reconstruct quickly, but do not rush; do not sacrifice speed to other important elements of recovery, such as community participation.

Sociologist Brenda Phillips has studied post-disaster recovery extensively. She argues that six principles characterize positive and sustainable disaster recovery: (1) an inclusive, participatory recovery planning and implementation process; (2) a focus on community quality of life; (3) a commitment to economic vitality and diversity; (4) a concern with social and intergenerational equity; (5) a focus on preserving and improving the natural environment and ecosystems; and (6) activities aimed at reducing the impacts of future disasters (Phillips 2009). Other scholars also offer guidance on how to accomplish holistic and sustainable community recovery. Mileti (1999) and Smith and Wenger (2007) point to five conditions that make for better recovery outcomes. Community involvement is essential.

Recovery policies should be based on as much relevant information as communities can gather, including details on the population and built environment, the local economy, and available sources of recovery funds. Recovery requires an organizational structure that comprises not only government agencies but also other community organizations, including emergent ones. Attention should be paid to modifying policies in light of the community's disaster experience, for example by changing land use patterns or by upgrading building codes to reduce future losses. There should also be an emphasis on identifying diverse ways of financing recovery.

Coordination among actors around providing assistance is essential for a resilient disaster recovery, but it is often difficult to achieve coordination. This is particularly true in less developed societies, which must rely on outside entities and international NGOs (INGOs) for recovery assistance. Disasters in less developed countries often spur into action various freelancers and organizations that want to demonstrate the efficacy of their particular disaster recovery solutions, with little interorganizational coordination. The 2010 Haiti earthquake is a case in point. Haiti was known as a “republic of NGOs” on account of the extensive involvement of nonprofits in virtually all aspects of community life and the weakness of state institutions. After the earthquake, many of those NGOs sprang into action and were joined by newcomers to Haiti who wanted to assist in any way they could, as well as by for-profit entities that provided assistance. At the same time, many government ministries had been destroyed in the earthquake and many officials were killed, which further eroded government capacity. That scarcely mattered, because NGOs were accustomed to bypassing the state, which they continued to do after the earthquake. The United Nations, which had a large presence in Haiti, was attempting to coordinate INGOs by clustering them together around key recovery tasks such as housing, but those efforts were largely ineffective in Haiti. NGO leaders rotated out of Haiti and were replaced so often that there was little continuity of effort. Decisions were made without input from the residents of the affected areas and, rather than coordinating, officials from different hard-hit jurisdictions competed for aid. The result was a disorganized relief and recovery effort fraught with duplication, service gaps, and ill-informed decision-making—for example, locating temporary housing in areas prone to flooding (Ritchie and Tierney 2011; Katz 2013). United Nations troops that were sent to Haiti from Nepal after the earthquake caused a cholera epidemic that killed thousands. Five years after the earthquake, the National Public Radio and the investigative journalism group ProPublica documented massive waste and lack of transparency by the Red Cross in Haiti (Elliott and Sullivan 2015). More recently, it was revealed that aid workers from Oxfam International, an INGO, held sex parties with earthquake victims and paid to have sex with residents who were forced into prostitution to make a living.

Social capital and disaster recovery

Political scientist Daniel Aldrich has explored the relationship between social capital and recovery in a range of disaster situations. In *Building Resilience: Social Capital in Post-Disaster Recovery* (Aldrich 2012a), he analyzed the role of social capital in facilitating community recovery in three major disasters: the 1923 Great Kanto (Tokyo) earthquake, the

1995 Great Hanshin-Awaji (Kobe) earthquake, and the 2004 Indian Ocean tsunami. In all three cases, he found that social capital, variously measured as voter turnout, political activism, civic and social movement participation, and “linking” connections to higher governmental levels, was a predictor of recovery outcomes such as a more rapid repopulation of damaged areas. With respect to the Kobe earthquake, Aldrich (2010) also noted that weak or absent social capital ties proved harmful. After that disaster, elderly survivors were randomly assigned to apartments in large complexes, but no consideration was given to keeping their pre-disaster social networks intact. With little opportunity to socialize, receive social support, or have someone to look after them on a regular basis, many of these elders died alone, and suicide was suspected in some of those cases. After the earthquake, the Japanese word *kodokushi*, “lonely death,” began to be used to describe these situations (see also Otani 2010).

Aldrich later turned his attention to studying recovery after the 2011 Japan earthquake and tsunami. Among other topics, he focused on the role of community elders and of the concept of *ibasho* in the recovery process. The term *ibasho* designates a place where people come together to interact informally and where they feel at home. In one of the worst affected communities, an NGO called Ibasho established the Ibasho Café as an informal community space, with the intention of building social capital and empowering elderly residents. In its first year, the café served more than 5,000 people and hosted more than fifty community-oriented events. In their research, Aldrich and his collaborators found that, for those who took part in its activities, the café encouraged the formation of social networks and restored a sense of belonging. Elders developed a sense of solidarity, as well as confidence in the progress they were making toward recovery. Moreover, through their participation in café events and activities, elderly disaster survivors found a renewed sense of purpose:

By demonstrating the knowledge, skills and experience they have to offer [elders] have proven that they are not just a vulnerable population who needs to be looked after and protected. Rethinking their roles in the community made many elders realize that they still want to be active participants in the community life. (Kiyota, Tanaka, Arnold, and Aldrich 2015: 32)

The Ibasho Café experience illustrates a point made earlier, in [Chapter 6](#): groups that are considered vulnerable by virtue of their social characteristics may still fare well after disasters if they are also resilient.

Researchers affiliated with the Mercatus Center at George Mason University conducted a series of studies and have published extensively on post-Katrina recovery (Chamlee-Wright 2010; Chamlee-Wright and Storr 2009, 2010, 2011). Their research provides a number of examples of how social, cultural, and religious ties influenced rates of return and recovery in the aftermath of Katrina. On the basis of their studies, they argue that financial assistance alone, even if substantial, does little good without the participation of civil society institutions in the recovery process. They also argue that local, bottom-up, non-bureaucratized recovery activities are more likely to be successful than top-down programs, because the former are more closely aligned with the needs and values of those affected by

disasters. Like other researchers (Aldrich 2010), the Mercatus Center group argues that, when governmental entities become involved in disaster recovery, they should do so in ways that restore and support social capital ties.

More rapid or, better, more sustainable recovery?

For many years, recovery processes were seen in a positive light if they resulted in a smooth and timely return to the *status quo ante*. Early discussions of the concept of resilience (e.g., Bruneau et al. 2003) also emphasized rapidity as a key dimension of resilience. It is now recognized that, while speed is important in some respects—for example, in getting victims the medical treatment they need and in restoring or replacing critical services such as the provision of water and other lifeline services—it is not necessarily associated with more resilient recovery outcomes. Acting in haste, communities may close off more desirable future options: for example, after a flood they may permit reconstruction in known flood-prone areas when they really should be taking other steps, such as buying out flood-prone properties or revising their land use plans. Community residents and business owners understandably want recovery to take place as swiftly as possible so they can get back to their lives, but there are many aspects of community recovery that require study and deliberation.

The recovery period is a time when communities have an opportunity to take steps that make them more resilient to future disasters and more sustainable overall. The tiny rural town of Greensburg, Kansas is one example. Greensburg experienced a devastating tornado in May, 2007 that almost wiped the town off the map. Facing such ruin, the community developed a long-term recovery plan aimed at making Greensburg a “green community.” Recovery policies specified that all public buildings over 4,000 square feet would have to be rebuilt to meet the highest standards established by the US Green Building Council, known as LEED-Platinum, and that they had to use renewable energy sources. Greensburg was successful in carrying out that vision. The idea spread to the private sector, with the result that Greensburg now has what may be the world’s only LEED-Platinum tractor dealership. In keeping with the town’s vision, the owners of that business went on to set up a wind-energy company. Greensburg attracted attention from around the world for its sustainable recovery practices and became the subject of documentaries, including one narrated by Leonardo di Caprio, as well as books such as *The Greening of Oz: Sustainable Recovery in the Wake of a Tornado* (Fraga 2012). The town is unlikely to experience a direct hit from a tornado in the future (although that cannot be ruled out), but it did seize recovery-period opportunities to build a more sustainable future. Tulsa, Oklahoma is another example of a community that steadily improved its disaster resilience over time as a result of a series of deadly and damaging floods. (See [Text Box 3](#) for details of Tulsa’s story.)

Critiques of the resilience concept

The concept of resilience is not without its critics. One problem with the term is that it is so widely used, by so many different constituencies, that its meaning has become increasingly vague. Diverse actors infuse the concept with diverse meanings, with little clarity or

consensus on what actually constitutes resilience. In many quarters it has supplanted old disaster terminology that refers to mitigation, preparedness, response, and recovery, subsuming those concepts, which have more concrete meanings, under the “resilience” rubric.

Critics also focus on what they see as the ideological aspects of the concept, noting how it consistently meshes with neoliberal constructions of the state and of social life (for discussions of neoliberalism, see Peck and Tickell 2002; Peck 2010). Neoliberalization, the reigning ideological and practical framing of state–society relations, envisions a diminished role for the state while privileging private sector and civil society solutions for societal challenges. Among other things, the process of neoliberalization presupposes devolution to the private sector of activities formerly performed by the public sector, for instance the delivery of services by private contractors and public–private partnerships as a means of addressing societal problems.

Neoliberalization typically brings about a rollback of state services and the requirement that recipients of assistance meet conditions set out by service providers—for example, by making work a requirement for government aid even if recipients are unable to work. It pressures individuals to be entrepreneurial by seizing opportunities for themselves; they should be flexible and adaptable—in other words, they should be resilient. If they are not, then they are not worthy of receiving support. By putting the onus of qualifying for assistance on the individual, neoliberalism treats receiving assistance as a privilege rather than as a right. To be resilient, individuals are urged to adapt in the face of forces such as rapid urbanization and climate change—forces that are framed as inevitable (see, for example, Rodin 2014). As Julian Reid observes, the pressure to cope in the face of those sorts of chronic and acute stressors produces a resilient subject, “which must permanently struggle to accommodate itself to the world ... a subject that accepts the dis-astrousness of the world it lives in as a condition of partaking in that world” (Reid 2013: 355). Resilient subjects are not political subjects with rights, but rather individuals who have “accepted the imperative not to resist or secure themselves from the dangers they face but instead adapt to their enabling conditions” (2013: 355). This view is echoed by other critics, such as Jonathan Joseph, who argues that “the recent enthusiasm for the concept of resilience across a range of policy literature is the consequence of its fit with neoliberal discourse” (2013: 38), which shifts responsibility for public welfare and well-being from the state to the individual. The resilient subject has no choice but to adapt in the face of societal and global changes that are framed as inevitable.

Text Box 3 Building Resilience into Recovery and Beyond: The Case of Tulsa, Oklahoma

Located on the Arkansas River and within the Mingo Creek watershed, Tulsa, Oklahoma has a long history of flood disasters: there were major floods in 1923, 1970, 1974, and 1976, as well as an especially deadly and damaging flood in 1984. Over all that period

the city's flood losses increased steadily, in part because the city had relied on levees and dams for flood protection and had allowed intensive development in the floodplain.

In response to repeated floods and other disasters (at one point, Tulsa led the nation in the number of federal disaster declarations), Tulsa devised a range of strategies meant to reduce flood losses. After the flooding in 1974, the city designed and initiated the Mingo Creek Improvement project, which protected approximately 700 homes from future flooding. Following another damaging flood in 1976, the city received federal funds to begin acquiring land in the floodplain. The city also passed a moratorium on building in the floodplain, developed comprehensive floodplain and storm water management programs, and established a flood early alert and warning system. After the 1984 flood, which left fourteen people dead, the city relocated 300 homes and a mobile home park, began a detainment basin project with the Army Corps of Engineers, established a city department of stormwater management, and initiated a stormwater utility fee. Over time, the city acquired 1,000 flood-prone properties, made decisions designed to preserve one quarter of the floodplain as open space, and adopted strict flood-resistant building codes.

Owing to its flood management initiatives, Tulsa received special recognition from the FEMA in 2000 and from the Department of Homeland Security in 2003 for its floodplain management efforts. The city currently receives a rating of 2 on the Community Rating Scale (the second-highest rating) for flood risk reduction, and as a result the flood insurance rates for Tulsa residents are significantly lower than those in other flood-prone communities around the country.

Tulsa is also a national leader in preparedness programs for floods, tornadoes, and other disasters. The city received funding during the 1990s under FEMA's short-lived Project Impact program, which provided support for loss reduction-planning projects, community education, and the development of public-private disaster preparedness partnerships. When that program ended, Tulsa developed a spin-off organization called Tulsa Partners, which continued that work and was especially successful in public-private partnership building. One notable public education project involved a 2003 partnership to distribute disaster preparedness materials in thirty-two McDonald's restaurants in Tulsa. The city also became active in Citizens Corps, a Department of Homeland Security program that was designed to engage community volunteers in disaster preparedness and response activities. In 2006, Tulsa Partners joined with the insurance industry-supported Institute of Business and Home Safety in order to establish a Disaster Resistant Business Council. Another collaboration with the nonprofit organization Save the Children focused on disaster preparedness for day-care centers.

Recent activities and efforts in Tulsa have extended beyond preparedness for extreme events. For example, in collaboration with the Tulsa Zoo, Tulsa Partners launched the Millenium Center for Green and Safe Living. The center, located at the zoo, provides environmental education programs for the public as well as information on both disaster-resistant and sustainable building materials and construction practices. The city also participates in the Mayors' Climate Protection Agreement, a project of the US

Conference of Mayors.

Decisions regarding floodplain management and other disaster loss reduction programs came about in a variety of ways. Repeated flooding made flood hazards difficult to ignore and led to the formation of citizen groups that pressured the local government to act. Although community pressure was initially ignored, flooding in 1976 and the subsequent involvement of a member of Congress helped gain additional support. The Army Corps of Engineers was a source of needed technical information, and the passage of the Water Resources Development Act, which was championed by the same Congress member, also provided a stimulus for further action. The 1984 floods occurred only nineteen days after the election of a new mayor, who subsequently organized a flood hazard mitigation team for the city. The mayor was assisted in these efforts by other committed local officials, including a city attorney, and by engineering consultants. Later, FEMA Project Impact funds provided support for coordinated local disaster loss reduction activities, and local businesses stepped in to continue those efforts when federal support ended.

Tulsa Partners changed its name to the Disaster Resilience Network in 2016. The city continues to garner recognition for its resilience-enhancing efforts. Tulsa recently joined the Rockefeller Foundation's 100 Resilient Cities initiative, which provides support for a chief resilience officer position as well as various types of technical assistance. (For additional discussions, see Patton 1994; Meo, Ziebro, and Patton 2004; Bullock, Haddow, and Haddow 2008.)

Disaster scholars observe that the diminished role envisioned for the state and the privileging of the private sector in activities such as disaster recovery—both of which are embedded in the neoliberal political economy and resilience discourse—inevitably create problems. In the United States, where neoliberal principles hold sway and shape disaster recovery practices, recovery activities have been increasingly privatized. Services delivered by the private sector are very expensive because private providers have to make a profit, which leads to bloated budgets. Giving private sector actors large amounts of money to perform services like those that are necessary in disaster recovery leads to a decline in transparency and accountability. Without adequate oversight—which is difficult to enact in large-scale disasters—private contractors engage in wasteful practices and are often free to decide for themselves who is worthy of receiving services. Benefits typically accrue to disaster survivors who have the means, connections, and cultural competence to navigate in the disaster assistance landscape—in other words, to survivors who are resilient by virtue of their high levels of social capital. Those who are unable to become “empowered consumers” in the post-disaster environment—the poor, the vulnerable, those who lack bureaucratic savvy—often receive far less than they deserve (Gotham 2012; Adams 2012).

Resilience theorists emphasize that true resilience involves not only adaptation in the face of shocks and stressors, but also transformative activities that overcome those stressors by drastically reducing them. This would mean, for example, shifting from fossil fuels to 100

percent renewable energy as a way of reducing the impacts of climate change (Pelling 2011), or greatly reducing income inequality as a way of reducing disaster vulnerability. These kinds of transformative changes can only be brought about by overcoming systems of power and privilege. However, in part because current resilience formulations rely in great measure on ecological scholarship, resilience discourse is largely silent on issues of power—issues that come to the fore when the focus is on social systems. Species adapt, but human communities can resist. We will return to these ideas in the next chapter.

Concluding Comments

In this chapter we have explored the concept of disaster resilience from a variety of angles: how it is defined, how it is measured at different levels of analysis, what factors contribute to resilience, and what constitutes resilient disaster response and recovery. We have also looked at programs that seek to enhance resilience in the face of hazards and disasters. Additionally, we have considered critical perspectives on resilience, particularly on the way it is framed and practiced in the context of neoliberalism. These critiques are important, but it is also important to recognize that *resilience does exist*. As we have seen, some communities, societies, and groups are simply better than others at mitigating, preparing for, responding to, and recovering from extreme events. This chapter has attempted to show why that is the case by emphasizing the importance of avoiding hierarchical notions of command and control, by insisting on flexibility and adaptability in response and recovery activities, and by understanding the needs of communities that have experienced disasters.

Notes

1. This literature refers to “families,” but I prefer “households,” which can include unrelated members, so I will use both terms interchangeably.
2. At the time when the Tangshan earthquake took place, China was much more of a centralized, Soviet-style state, with strong governmental control over most aspects of its social and economic life. China was poorer, more rural, and much less developed. Like the Soviet Union, China did not permit the dissemination of information about the disasters that took place within its borders. The outside world learned about the Tangshan catastrophe only gradually, over a period of years.