1 | *Introduction to Disasters, Change, and Community-Level Resilience*

1.1 A History of Extreme Flood Events

Diverse weather- and climate-related disasters have occurred over United States history, too often causing extensive damage to infrastructure and property and leading to loss of life. Of all types of weather-related disasters in the United States, floods have caused the greatest amount of damage and disruption to lives, livelihoods, and property (Brody, Highfield, & Kang, 2011). For example, the Great Flood of 1993 – typifying slow-moving Midwestern floods caused by extended periods of precipitation across a vast area – overtopped and destroyed levees as rivers swelled beyond capacity, with damages exceeding $15 billion. A different type of flood event can strike mountain regions, such as in Colorado in 2013, where flash floods scoured river corridors with 20-feet-high walls of water rushing down mountain canyons, destroying or damaging communities. Coastal inundations from hurricanes and tropical storms have dumped inches of rains, often within days, flooding cities of the southern and eastern coasts, such as during Hurricane Harvey in Texas, Hurricane Florence in North Carolina, and Superstorm Sandy as it travelled up the eastern seaboard.

These are just a few examples in the long history of flooding that have shocked and altered many communities in the United States. Disastrous floods and other extreme climatic events can motivate a variety of changes, including in household behaviors and revision of policies at the local, state, and federal levels of government. With the goal of reducing future risks, governments – and sometimes nongovernmental actors – can respond to, recover from, and plan for the future with a focus on reducing the vulnerability of their communities to future disasters. Some extreme events may motivate changes in policies, but disasters often do not lead to learning, particularly the types that require examination of past failures and changes in beliefs

about a policy problem (Birkland, 1997, 2006). In the wake of disasters, the recovery of damaged or destroyed communities and neighborhoods is often slow, bureaucratic, and incomplete. Minor policy changes may occur in the aftermath of a disaster, but rarely are policies examined, much less the core of policies overhauled or new risk-mitigating solutions enacted.

Much of what is known about the drivers of policy changes in response to disasters, and specifically extreme flooding, has been learned from studies at the national level focused on changes in national policies, programs, and funding mechanisms. As the locus of flood management in the United States, and elsewhere, has shifted from the federal to the local level, communities increasingly face decisions about how to prepare for, recover from, and reduce future risks of extreme flood events (Brody, Zahran, Highfield, Bernhardt, & Vedlitz, 2009). After a disaster, actions at the local level can be encouraged or constrained by other levels of government. Furthermore, nongovernmental organizations often play a key role in disasters, providing resources and capacity during response and recovery. The public, through engaging in flood recovery processes and through their personal decisions about rebuilding, also affect whether or not a community moves toward resilience. Other community stakeholders, such as businesses, can also play important roles during disaster response and recovery, including providing resources in emergency response and participating in long-term recovery processes. As this book presents, all of these actors and organizations have a role in whether governments and communities learn from disasters and make changes to become more resilient to future disasters.

1.1.1 Deadly Floods in the United States: Federal Changes and Lessons Learned

America's expansion across the continent was defined by attempts to control the environment. Land was converted from forests, wetlands, and prairies to farmland, indelibly altering the landscape and Indigenous communities from East to West. From the time around the Civil War, the Mississippi River was managed by the Army Corps of Engineers ("Corps") through a system of levees, under the belief that this system could adequately control the river and prevent deadly flooding (Arnold, 1988).

The river management approach developed in the early 1920s focused on managing the rivers for transportation, with little emphasis on flood management. The Corps had decided that it was not necessary to design emergency floodways to release water, even though scientists suggested such approaches (Barry, 2007). The Great Flood of 1927 changed that. The system of levees failed, bringing extensive damage to the lower Mississippi Basin, killing more than 500 residents, affecting lives and livelihoods of approximately 1 percent of the U.S. population (Barry, 2007). Caused by many months of severe rains in the Mississippi River Basin, the river swelled, overtopping and damaging levees along the river, displacing hundreds of thousands of residents who lived near the bloated river, disproportionately affecting African American communities living and working near the river and its tributaries (Barry, 2007). The Red Cross served over 300,000 displaced flood survivors, and hundreds of thousands lived in temporary tents. The flood encouraged continuing migration of African Americans from flooded communities in the South to urban areas in the North. Disasters, such as flooding, continue to disproportionately affect communities of color and have led to the displacement of marginalized peoples (Adeola & Picou, 2017; Bolin & Kurtz, 2018).

In the aftermath of the 1927 flood, flood mitigation centered on reengineering rivers to control and manage the flow of water heading downstream (Birkland, Burby, Conrad, Cortner, & Michener, 2003; Brody, Kang, & Bernhardt, 2010). The 1927 flood appears to have helped shift how the Army Corps approached river management – a shift from a levee-only approach to one that incorporated other structural methods of managing rivers. The U.S. Congress later enacted the Flood Control Act of 1936, an embodiment of this new focus on structurally managing rivers to prevent flooding. These changes stemmed in part from the national politics of the time, with the New Deal era prioritizing federal funding of large projects to put people back to work after the Great Depression. The 1936 Act increased funding for a number of public works projects across the nation. The damaging floods in 1927 and the ensuing focus on large federal public works projects, which followed less severe flooding earlier in the century, brought about policy change and a change in the approaches to managing rivers.

During this same period – the 1920s and 1930s – on the plains, farmers tilled their fields and overplanted until prolonged drought pushed ecosystems to ruin. Dark storms of dust blanketed millions of

acres of land and starved farmers and their families out. Lessons were learned from many of these disasters – illustrated by the formation of the Soil Conservation Service in the wake of the Dust Bowl and improved flood management and levee construction – but such learning is not guaranteed when humans face disasters. Learning is uncertain at all times, but especially when the disasters that catalyze such learning are – at least in part – caused by how humans live on and manage their lands. Humans resist changing beliefs and practices, particularly when they play a role in causing catastrophes. From personal relationships to national politics, it is difficult to admit when we are wrong.

1.1.2 Extreme Floods of the Late Twentieth Century

As floods from 1927 to 2013 illustrate, extreme, damaging, and deadly floods are not new to the United States. While not novel, evidence suggests that they are becoming more frequent and damaging, but also less deadly (Intergovernmental Panel on Climate Change, 2012; Milly, Wetherald, Dunne, & Delworth, 2002). Extensive floods – greater than 100-year floods that occur in large river basins – have increased in frequency in some regions of the United States (Collins, 2009). Due, at least in part, to growing development and the value of development in flood-prone areas, damage estimates are also increasing (Kundzewicz et al., 2014).

Flooding during the first two decades of the twenty-first century (2000–2020) continued, including deadly and destructive hurricanes. Most notoriously, Hurricane Katrina struck southern Louisiana in 2005, killing over 1,800 people, displacing hundreds of thousands of others, and causing billions of dollars in damages. The Federal Emergency Management Agency (FEMA) estimated that Hurricane Katrina damaged or destroyed more than 200,000 homes in Louisiana alone (DHS, 2006), with a total damage estimate of more than $100 billion (in 2020 dollars).

In 2012, Superstorm Sandy struck the Bahamas, Cuba, Jamaica, Puerto Rico, the Dominican Republic, and Haiti before tracking north where it left more than $70 billion dollars in damage. The storm damaged 24 states along the East Coast of the United States and caused more than 160 deaths (Diakakis, Deligiannakis, Katsetsiadou, & Lekkas, 2015). This is currently ranked the fourth most damaging

U.S. storm in terms of costs – after Hurricanes Katrina (1st), Harvey (2nd, Texas, 2018), Maria (3rd, Puerto Rico, 2017), and Irma (4th, Puerto Rico, 2017). Again, the damage of these hurricanes disproportionately affected communities of color and under-resourced communities, whether in New Orleans, Houston, or Puerto Rico.

But extreme, repetitive flooding has also occurred in other regions of the United States. Extensive flooding in the Mississippi River Basin has repeatedly exacted extreme levels of damage, with severe impacts in 1993, 2011, and 2019, affecting large swaths of agriculture and communities along the river and its tributaries with damages totaling billions of dollars. States that live with continual threat of floods – whether from coastal risk, Midwestern seasonal floods, or more sudden western flash floods – have dealt with the risk of floods to varying degrees. As readers will learn in this book, there are vastly different approaches that government decision-makers can take when confronted with flood risks and disaster recovery.

1.2 Disasters and the Disaster Cycle

As disasters like the ones described here strike, response to and recovery from the devastation often unfolds in an ongoing iterative process of preparing for, responding to, and recovering from disaster, followed importantly by longer-term planning and risk mitigation for the next disaster. These phases are often more formally delineated into disaster preparation, emergency response, long-term recovery, and hazard mitigation (Petak, 1985). This simplification of the trajectory of disaster management conceptualizes these four phases as distinct, but on the ground, communities will say that these activities often overlap and are frequently nonsequential. A variety of policy actors and organizations may participate to varying degrees throughout the disaster cycle. These actors may shift roles across the different phases or alter the type and intensity of their activities depending on their responsibilities. Community members, specific sectors (e.g., business versus residential), individual neighborhoods, and whole communities often experience trauma and grief during the disaster cycle (Bates, Fogleman, Parenton, Pittman, & Tracy, 1963; Kaniasty & Norris, 1999). Learning and change, at both the individual and community levels, may occur throughout the cycle.

Attention to any disaster varies throughout the cycle, with attention peaking just prior to, during, and after the disaster event. Media

coverage and public attention typically peaks during disaster and declines as time elapses (Crow, Albright, & Koebele, 2017; B. Miles & Morse, 2007). In the immediate aftermath of a disaster, government leaders and agencies focus on actions to save lives and protect property. During long-term recovery, governments often widen their focus to a broader array of policies and practices with the aim of restoring the social, economic, and political functions of a community. Support for hazard mitigation is greatest after a disaster as windows of opportunity for policy change open briefly (Birkland, 1997; C. B. Rubin, Saperstein, & Berbee, 1985). Engaging the public during hazard mitigation, outside of an immediate disaster, is often challenging, as other non–disaster-related issues compete for public attention. The overwhelming desire is to get back to normalcy, and communities become fatigued from the ongoing disaster-related focus (Peek, 2012; G. P. Smith, 2012). A complex set of policies and programs across all levels of government determines management during immediate emergency response through long-term recovery from major disasters. Whether these policies and programs change in response to disaster experiences has a lot to do with timing – as it relates to time since a disaster, attention to disaster-related issues, and overall salience of risk and disasters within a community (e.g., seasonal variance).

1.3 Focusing Events and Disaster Policy Subsystems

Disasters *may* serve as focusing events: "an event that is sudden; relatively uncommon; can be reasonably defined as harmful or revealing the possibility of potentially greater future harms; has harms that are concentrated in a particular geographical area or community of interest; and that is known to policymakers and the public simultaneously" (Birkland, 1998, p. 54). A focusing event raises awareness of and attention to a problem, potentially creating opportunities for policy changes to emerge. In the aftermath of such an event, the actors and organizations that address the variety of problems that stem from disasters work in a domain that spans across governmental sectors and levels. The concept of *disaster policy subsystem* captures these actors and organizations (Crow, Albright, & Koebele, 2021). This concept is similar to the term "policy regime" posited by May and Jochim (2013), which describes "the constellation of ideas, institutional arrangements, and interests that are involved in addressing policy problems" (p. 426).

Policy regimes are not limited to an affected geography, whereas a policy subsystem is, which is necessary for conceptualizing local-level disaster policy actions. In the aftermath of a community-level disaster, a new policy subsystem may emerge consisting of a system of individuals, agencies, experts, and organizations (governmental and nongovernmental) who are all involved in addressing the milieu of policy problems and issues that stem from a disaster during recovery. Contrasting this, at the federal level in the United States, a more established disaster policy subsystem exists, in part dictated by the federal legislation enacted by Congress and embodied in several federal agencies and departments to help manage disaster response and recovery. The local-level disaster policy subsystem, then, is likely more nimble and malleable, emerging as a specific subsystem only when disaster-related issues are under discussion and then dissipating back into related longer-term subsystems (i.e., transportation, public works, etc.).

1.4 Federal Governance of Disasters in the United States

Within a disaster policy subsystem, engagement by a variety of government and nongovernmental actors varies across the disaster cycle. In the United States, issues of federalism, including specifying and clarifying the roles of federal, state, and local governments in emergency response and disaster recovery, permeate disaster policy (Moss, Schellhamer, & Berman, 2009). The Federal Emergency Management Agency (FEMA) was formed in 1979, through executive order of President Jimmy Carter, to manage federal disaster-related functions (FEMA, 2019). At its inception, FEMA's mission included funding and coordinating emergency preparedness, implementing immediate emergency response, funding post-disaster reconstruction, and supporting hazard mitigation. Amending the Disaster Relief Act of 1974, the U.S. Congress enacted the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* (Stafford Act) in 1988 that clearly defined a major disaster and the federal disaster declaration process. The Stafford Act defines a major disaster as:

any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause,

any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this chapter to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.[1]

The Stafford Act gave authority to FEMA to administer disaster relief and recovery programs. In the aftermath of the deadly terrorist attacks on September 11, 2001, Congress enacted the Homeland Security Act. This legislation created the Department of Homeland Security (DHS) and brought FEMA under its jurisdiction, reducing the direct lines of communication to the president that FEMA had previously enjoyed. In response to the policy failures of the federal government during and after Hurricane Katrina that devastated the Gulf Coast (Birkland & Waterman, 2008), the Senate Committee on Homeland Security and Government Affairs in the 109th Congress issued the Special Report titled "Hurricane Katrina: A Nation Still Unprepared." In their report, the Senate Committee concluded:

But the suffering that continued in the days and weeks after the storm passed did not happen in a vacuum; instead, it continued longer than it should have because of – and was in some cases exacerbated by – the failure of government at all levels to plan, prepare for, and respond aggressively to the storm. These failures were not just conspicuous; they were pervasive. (U.S. Senate, 2006, 109–322, p. 1)

Hurricane Katrina led to a number of policy changes as outlined in a 2007 Congressional Research Service report (Congressional Research Service, 2007). Six new pieces of legislation dealing with disasters and emergency management emerged from the failures of Hurricane Katrina, including Title VI of P.L. 109–295 (H.R. 5441), the *Post-Katrina Emergency Management Reform Act of 2006*. These policy changes restructured FEMA and clarified its roles and that of DHS in managing disasters.

Although several other federal, state, and local programs are involved in disaster recovery, the federal policies described here establish the framework for the federal approach to disaster recovery during the 2013 Colorado floods. Under the Stafford Act, once a governor of

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[1] 42 U.S.C. § 5122(2).

a state requests a disaster declaration from the federal government, the president decides whether to make such a declaration. Rules promulgated by DHS and FEMA govern the allocation of disaster-related resources from the federal government to the states. These regulations stipulate how federally-provided funds can be spent, as well as cost-share allocation between federal, state, and local governments. Federal regulations dictate the types of costs that can (or cannot) be reimbursed through the Public and Individual Assistance programs managed by FEMA (Bea, 2010; Stafford Act, 2000). The regulations established to help manage the recovery process – particularly allocation of recovery funds through a reimbursement process – may constrain decisions by local and state governments because they have to pay for recovery costs while they wait for reimbursement and manage the complex reimbursement process in order to maximize their reimbursement (Becker, 2009). As climate-related disasters increase in number and severity, it is unclear if the current system of disaster management is prepared to fund, manage, and mitigate disasters moving forward.

1.5 Managing Climatic-Related Disasters in a Changing World

The increasing frequency and severity of disasters stem, at least in part, from changing climatic and human development patterns. Increasing risks also result from our collective lack of focus on risk and vulnerability reduction, at both the individual and community levels. In the United States and throughout the world, populations are growing in areas prone to climate risks, including areas at risk of flooding. As populations increase along rivers and in coastal areas, communities become more at risk of flooding. Along with this trend, humans are increasingly congregating in urban areas, underscoring the importance of addressing the connected challenges of growth, urbanization, and climate change. It is critical to understand how these disaster-related dynamics play out at the local level, and more specifically how communities experience, respond to, and recover from climate-driven disasters.

The combination of exposure and vulnerability to a hazard, such as an extreme flood, forms the overall risk of disaster. As such, the risks from flooding depend on both the environmental and human factors that drive the event, as well as the vulnerability of populations who experience the impacts stemming from the disaster. The United

Nations Intergovernmental Panel on Climate Change (IPCC), a consortium of scientists working in collaboration to more fully understand the drivers and effects of climate change, explains the dynamics of exposure and vulnerability that drive climate-related risks:

Exposure and vulnerability are dynamic, varying across temporal and spatial scales, and depend on economic, social, geographic, demographic, cultural, institutional, governance, and environmental factors (high confidence). [2.2, 2.3, 2.5] Individuals and communities are differentially exposed and vulnerable based on inequalities expressed through levels of wealth and education, disability, and health status, as well as gender, age, class, and other social and cultural characteristics. [2.5] (IPCC, 2012)

The IPCC has found links between climate change and flooding (IPCC et al., 2001). In 2001, the IPCC predicted an increase in precipitation intensity in a number of regions due to increased greenhouse gas concentrations in the atmosphere (Durman, Gregory, Hassell, Jones, & Murphy, 2001; Hennessy, Gregory, & Mitchell, 1997; Kothavala, 1997; Yonetani & Gordon, 2001). The U.S. Global Change Research Program, in its Fourth National Climate Assessment report (NCA4), found increasing risks of climate change coupled with aging infrastructure as major threats in the United States. The report also pointed to significant changes in water quantity and quality across the United States. The processes that drive riverine flooding are complex and differ across regions. The limited knowledge of mechanisms driving regional differences limits our capacity to clearly predict future trends in flooding. That said, predicted increases in intensity of rainfall under a warming climate will result in increases in flood magnitude and frequency (Berghuijs, Woods, Hutton, & Sivapalan, 2016). In an analysis of flooding in the Western United States, particularly the effects of rain-on-snow flooding, Musselman et al. (2018) predict that 55 percent of basins in the North American West will experience increases in water availability. The risks of flooding stem from increased rain-on-snow runoff in conjunction with greater intensity of rainfall and more precipitation falling as rain (instead of snow), leading to predictions that flooding will increase from between 20 to 200 percent (Musselman et al., 2018). In snowy mountainous regions, such as Colorado, scientists also predict that the number of rain-caused winter floods will increase, with a shift away from springtime floods driven by snow melt.

As climate change causes less predictable, more variable, and increasingly extreme weather across the world, disasters will ensue. Coupled with growing populations in risk-prone areas like coastlines and wildland urban interface zones, local governments will deal with disaster-related issues more frequently. Questions about how to cope with and plan for these events will consume attention, time, and resources for governments in the future.

Because hazard exposure and vulnerabilities vary from community to community, it is critical to understand the local experiences of disasters and disaster recovery. The recovery process is driven by resources and constraints of communities (G. P. Smith & D. Wenger, 2007). The types and amounts of resources available to a community before, during, and after a disaster may influence how a community recovers and the extent to which the community learns and changes in response to the disaster.

1.6 Community-Level Policy Change and Learning

In the midst of the radical changes taking place due to climate change, human development, and other factors such as technology and globalization, it is easy to forget that disasters are inherently and necessarily socially constructed (K. Tierney, 2014). Disasters – by definition – are events that cause harm to humans, their property, and their communities. Furthermore, humans create the conditions for disasters and if not for humans developing in hazardous areas or placing vulnerable development in those areas, disasters would not occur. Public policy plays a critical role in this nexus of humans, the natural world, and disasters. How we govern the environment, develop our communities, use energy, and insure losses from disasters are all examples of policy playing a critical role in risk creation/reduction, disaster preparedness, response, and recovery. Policies and the processes that produce them have a vital role to play in how humans socially construct disasters, as Tierney argues they do.

Immediately following and sometimes for decades after a disaster, decision-makers face a number of decisions about if, how, and where to rebuild infrastructure, residences, and commercial areas. Community leaders must also consider how to interact and engage with the public and other stakeholders, including business and non governmental and faith-based organizations. Extreme flood events,

like the flooding in 2013 in Colorado detailed in this book, offer a prism through which to examine local-level learning and change. Many other communities may experience a similar event in the future, whether a flood disaster or other type. As such, the floods examined in this book offer an opportunity for communities to learn from experience and alter policies, programs, and processes to mitigate risks and increase resilience moving forward.

The policy literature defines and operationalizes learning in a variety of ways, focusing both on what is learned and who is doing the learning. Birkland asserts that learning is "a process in which individuals apply new information and ideas or information and ideas elevated on the agenda by a recent event, to policy decisions" (Birkland, 2006, p. 22). Learning may take place at a variety of different levels, from the individual- (micro), the organization- (meso), and to system-level learning (macro) (Moyson, Scholten, & Weible, 2017). With a focus at the meso scale, this book examines the extent to which seven Colorado communities learned and changed after an extreme flood event. Learning, broadly conceptualized, includes a range of actions and processes that involve collection and analysis of information to produce knowledge. For example, existing or former government practices, processes, and policies may be examined to look for root causes of failures that led to disaster. Beliefs about the causes underlying a disaster may also be examined and perceptions about severity of the risk of future disasters may shift.

Learning from disasters may be critical to reducing future exposure and vulnerability to similar events, but the policy literature suggests that learning from disasters is rare (Birkland, 2006). The policy change and crisis literature proposes multiple processes and factors that may explain the occurrence of policy changes in the aftermath of a disaster (Nohrstedt & Weible, 2010; Sabatier & Weible, 2007b). Understanding the factors that lead (or do not lead) to learning and adaptive policy change in local governments may prove critical, since this can chart a community's path – whether toward ongoing vulnerability to extreme events or long-term resilience. As such, this book provides insight into what factors lead a community – with particular attention on local governments that govern those communities – to learn, make changes, and move toward greater resilience after disaster strikes.

After a disaster, the type and depth of learning that occurs may be propelled or limited by a variety of factors, such as resource

Table 1.1. *Operationalization of learning concepts*

Type of learning	Relevant learning framework
Reflection on past experiences	Policy-oriented learning, social learning (Birkland, 2004; May, 1992; Sabatier and Jenkins-Smith, 1999)
Goal redefinition	Social learning (Birkland, 2004; May, 1992; Sabatier and Jenkins-Smith, 1999)
Belief change	Policy-oriented learning, social learning (Birkland, 2004; May, 1992; Sabatier and Jenkins-Smith, 1999)
Changes in policy instruments	Instrumental learning; Lesson drawing (Birkland, 2004; May, 1992; Rose, 1991)
Learning from others' experiences	Lesson drawing (Rose, 1991)
Learning about governmental organizations	Government learning (Bennett and Howlett, 1992; Etheredge, 1981)
Learning about strategies and tactics	Political learning (Birkland, 2004; May, 1992)
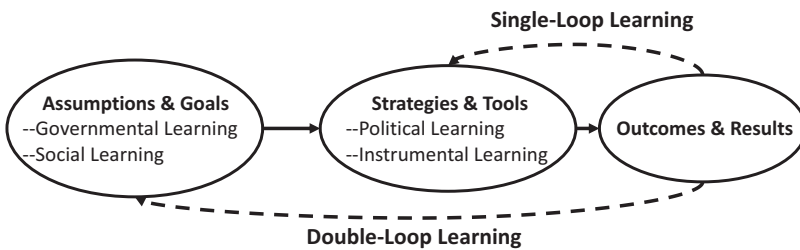
Figure 1.1 Single- and double-loop learning and learning concepts (Crow, Albright, Ely, Koebele, & Lawhon, 2018)

availability and public support. The extent or depth of learning observed can fall along a continuum, as depicted in Table 1.1, from simple lesson drawing on single-loop learning to more in-depth learning processes that include reflection on past events and policies or reexamination of goals and objectives. This latter type of learning is akin to double-loop learning (Figure 1.1), which includes modification

of underlying goals and assumptions in addressing an issue (Argyris, 1977, 2001).

Double-loop learning may increase a community's ability to change and adapt to shocks and perturbations, such as disasters. A continuum of learning, as applied to communities after a disaster, may begin in a simple form such as copying or mimicking practices from other communities (lesson drawing), as discussed by R. Rose (1991) and others (Birkland, 2006; Heikkila & Gerlak, 2013). Policy-oriented learning, as conceptualized in the Advocacy Coalition Framework (Sabatier & Jenkins-Smith, 1993b; Sabatier & Weible, 2007a), is more robust learning and entails changes in beliefs about causes and the severity of a policy problem, whereas, similarly, social policy learning, as defined here by O'Donovan (2017), is "new understanding of a policy by a change in the social construction of the problem and the causal reasoning underlying the definition of the problem" (p. 543). As shown in Figure 1.1, social learning, the most in-depth type of learning, requires double-loop learning that involves a deeper analysis and discussion of past failures and a reconsideration of goals and objectives (Hall, 1993).

1.6.1 Stakeholders in Community-Level Learning

As communities potentially engage in learning after disasters, a number of stakeholders are key to disaster recovery, learning, and resilience-building. Community members and organizations as well as outside stakeholders can be part of the decision-making and corollary processes that make learning after disasters more likely. Depending on the disaster phase, various types of stakeholders may be more likely to engage in disaster-related activities. Some of these actions and stakeholders are more closely connected to learning processes than others. For example, during disaster response, actions such as evacuation and provision of temporary housing for residents are often provided by nongovernmental organizations, including the faith community and disaster response organizations such as the Red Cross, when local and state governments do not have adequate resources (Peacock, Dash, & Zhang, 2007). Many of these groups come from outside the disaster-affected community, which can cause problems with coordination and assistance based on differing approaches, cultures, or demographics of the outside assistance groups (Majchrzak,

Jarvenpaa, & Hollingshead, 2007; Quarantelli, 1988; Stallings & Quarentelli, 1985). Some groups that fall within this category may also work in disaster recovery phases. For example, some faith-based groups rebuild housing after disasters. Regardless of their activities, outside groups typically leave a disaster-affected community once their work has concluded. While these activities are vital to a community's recovery, they may not be linked to learning after a disaster.

Other stakeholders that live and work within a disaster-affected community will also engage in the work of response and recovery. During response to a disaster emergent groups within communities may arise that include residents, civil society nongovernmental organizations, and local businesses (P. Kennedy, Ressler, Rodriguez, Quarantelli, & Dynes, 2009; Majchrzak et al., 2007; G. P. Smith & D. E. Wenger, 2007; Stallings & Quarantelli, 1985). During disaster response, there are numerous examples of stakeholders beyond local governments playing important roles to assist their communities. For example, after Hurricane Katrina, Walmart assisted in bringing supplies into the hurricane-affected zone because their logistics chain was superior to the emergency management supply chains in place at the time (Cooper & Block, 2007). During disaster recovery, however, there is less known about the most appropriate role for various stakeholders in assisting their communities in recovery. Disaster scholarship indicates that collaboration and community engagement can lead to superior disaster recovery outcomes (G. P. Smith, 2012; G. P. Smith & D. E. Wenger, 2007), but less is known about how engagement in disaster recovery by a variety of stakeholders can lead to learning within a community or toward higher levels of community resilience.

A number of major categories of stakeholders are included when discussing the actors that may engage in disaster activities. Residents of local communities and their governments (local, state, and federal) are the focus of much discussion in this book. Beyond these actors, who readers will learn about, it is worth briefly noting the importance of several others that are also important as this book details disaster recovery processes. First, faith-based organizations are not formally delineated as actors in disaster response and recovery, but time and again disaster-affected communities will point to the importance of these groups in navigating the emergency and its aftermath (Adams, Prelip, Glik, Donatello, & Eisenman, 2018; J. D. Rivera, 2018; J. D. Rivera & Nickels, 2014). Many faith-based groups engage in disaster

response through housing, feeding, and volunteering during this phase of a disaster. Others continue their work during disaster recovery, primarily in providing and rebuilding housing for disaster-affected residents.

Second, civil society organizations of various sorts engage in disaster activities. These stakeholders can take a variety of forms and are most often engaged in disaster response efforts and rebuilding, similar to faith-based organizations (Aldrich, 2008; Lein, Angel, Bell, & Beausoleil, 2009). Some, however, work on risk mitigation over the longer term, such as through education and resource provision in hazards reduction (Shaw & Izumi, 2016). Numerous studies demonstrate the importance of active civil society organizations to successful disaster response and recovery, particularly in the building of social capital after a disaster (Aldrich, 2008).

Third, the business community is a varied group of actors and organizations within most communities. They can be large multinational corporations or small local businesses or something in between. Businesses are well known for engaging in internal risk analysis, but a growing body of literature also focuses on nonmonetary risk calculations by businesses wherein they try to understand disaster risk or manage it before entering a new market (Oetzel & Oh, 2015; Oh & Oetzel, 2011; Oh, Oetzel, Rivera, & Lien, 2020). There is similarly a large area of scholarship focused on the effects of disasters on businesses (P. Kennedy et al., 2009; Runyan, 2006; K. J. Tierney, 2007; Webb, Tierney, & Dahlhamer, 2000). Less is known, however, about the role of businesses as members of a community during and after disasters. Due to the variety of businesses within disaster-affected communities, we may see business roles span a range, from those that look more like local civil society organizations to those that are disengaged outsiders to a community. As chapters throughout this book detail, the various stakeholders within a community that work to aid in disaster recovery may be critical to the learning that takes place and the eventual outcomes of recovery.

1.7 Flood Recovery in a Changing Climate, an Increasing Emphasis on Resilience

Although communities may learn and change policies after a disaster, higher-level learning rarely stems from disasters (Birkland, 2006).

Furthermore, it is often unclear what lessons communities learn and how they implement the lessons through changes in policies and programs. It may be the case that communities learn, but learning does not necessarily mean that communities have reduced future risks or become more resilient through major changes, such as building in a more adaptive manner to their existing hazards, building outside of hazard areas, planning future development with existing hazards in mind for vulnerable populations like the elderly, people living with disabilities, and children in school settings. Changes in policies may or may not lead to increased resilience. For example, in a study of local-level policy failures and learning, O'Donovan (2017) examined three cases of policy failure revealed by tornados in Greensburg, Kansas (2007); Joplin, Missouri (2011); and Moore, Oklahoma (2013). While Greensburg learned and changed after a tornado devastated the town, the lessons gleaned focused on sustainable building standards rather than about reducing the risk of damage from future tornados (O'Donovan, 2017). These findings suggest that it is critical to not only investigate the drivers and extent of learning that occurred, but also the content of these lessons and policy changes to see if such learning promotes risk mitigation, reduction in vulnerabilities, and increased resilience.

Resilience is defined, operationalized, and measured through a variety of theoretical and epistemological frames, including engineering, ecological, social, and socio-ecological lenses (Folke, 2006). Some scholars define resilience as the ability of a system to experience shocks and return to function as quickly as possible. Resilience is, however, also more than this. In a changing environment with many simultaneous and possibly compounding risks, a greater emphasis must be placed on resilience-building instead of the management of singular, isolated events or hazards. Returning a system to its previous functions may also be inadequate to withstand future shocks from a variety of sources, be they social, economic, or environmental risks.

Social-ecological resilience captures "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political, and environmental change" (Adger, 2000, p. 347). Community resilience, as conceptualized by Cutter et al. (2008), stretches beyond the engineering and ecological conceptualizations of resilience to include multiple factors: ecological, social, economic, institutional (plans and standards), infrastructure, and community

competence (health, understanding of risk, quality of life, etc.). Magis (2010) centers her definition of community resilience on the community members themselves and the extent of their capacity to respond to change, engage in community-level decisions about resource use, and thrive in a context of uncertainty (Magis, 2010).

Community resilience, as conceptualized in this book, encompasses the ability of a community – including the government and community members – to anticipate, learn from, and adapt to shocks by integrating new knowledge from past experiences to reduce the impacts of future risks. To build resilience, communities must build upon social connections, capacity, capacity-building strategies, and resources of natural and built capital to recover from a disaster while reducing the risks of future events. Communities that think about system-wide risks and vulnerabilities holistically, instead of individually, may be more successful in building resilience (Johansen, Horney, & Tien, 2017). Those that lack resources and therefore rely on financial or other support from outside of their community, such as FEMA and state funds, may be more limited in their ability to adapt and become more resilient. This book explores the various factors that make communities more likely to learn and make changes to policies that build resilience after a disaster. The lessons presented in this book matter to all communities – whether faced with risks from wildfires, floods, hurricanes, pandemics, industrial accidents, or economic decline. The various shocks that can alter a community all demand a similar set of community capacities, actions, and characteristics in response even though they may involve other factors that are unique (e.g., terrorist attacks involve law enforcement investigations while pandemics involve public health agencies and ongoing contagion, but both involve the aspects of resilience discussed here).

1.7.1 Drivers of Community Learning and Resilience

Disasters can increase and focus a community's attention on disaster-related concerns, including emergency response, recovery, and preparedness issues. A growing body of scholarship highlights potential drivers of post-disaster learning and policy change. While much of the literature addresses learning at the national or federal level (see, e.g., Birkland, 2006), an increasing number of studies have examined local-level recovery and learning (e.g., O'Donovan, 2017). One crucial

missing piece of disaster recovery research is understanding the processes and arrangements that lead to learning and the adoption of policies to reduce community vulnerability to future events (Berke, Kartez, & Wenger, 1993). This book presents a framework of community-level learning after disasters, articulating a set of critical characteristics of communities that see more successful resilience-building in the aftermath of disasters.

First, resources available to a community's local government after a disaster are critical to processes and outcomes of disaster recovery. These resources can be internal to a community or external, and may include significant inflows of new resources. Access to diverse resources (including financial, public support, technical, and administrative capacity) may influence a community's ability to learn and recover from a disaster. Successful recovery is seen in communities where local empowerment, leadership, and planning for sustainability are all key components of the recovery process (Garnett & Moore, 2010). Personal and organizational linkages within a community, as well as the relationships to organizations outside of the community, may help increase resources (Berke et al., 1993). Relationships and trust between local and other levels of government may also affect recovery by either encouraging or discouraging learning and change.

Resources are closely associated with a second factor: type and extent of disaster damage incurred. Low-capacity governments or those that face significant disaster damage may be more reliant on external resources for successful disaster recovery and their processes may be dictated by higher governmental authorities. Damages caused by a disaster and access to resources in its aftermath, both internal and external, may dictate, in part, the extent to which a community can recover from a disaster.

Beyond resources and damage, *intergovernmental dynamics and relationships with higher governmental authorities are important to consider when applying our understanding of learning after a disaster to local governments.* Relatedly, the level of autonomy a local government enjoys is vital to consider with regard to the degree to which a local government can actually enact changes. The degree of autonomy a local government has is connected to its status as a Home Rule or Dillon's Rule community and is discussed further in Chapter 8.

Additionally, *internal community characteristics can influence disaster recovery outcomes.* These include the size and demographic

composition of a community. Also internal to a community, participatory processes established during disaster recovery and planning are important, as is information dissemination of risk and disaster-related information to the public. These various internal community factors may also influence the degree to which individuals are concerned about the disaster, and this in turn may influence community member support of policy decisions made by their local government during disaster recovery. A community's history, beliefs, and culture may also influence how communities experience, learn from, and adapt to disasters. Communities with higher levels of social capital and a history of community participation – including by a variety of stakeholders across demographics and sectors of a community – can more effectively and quickly recover and move toward resilience when community leaders harness this social capital for collective decision-making (Nakagawa & Shaw, 2004). The stronger these ties within and outside a community, the more likely successful recovery will be in post-disaster contexts. Kweit and Kweit (2004) and others (Farquhar & Dobson, 2004; Stallings & Quarentelli, 1985; Wilson, 2009) have found that public engagement in recovery was key to long-term stability of communities. A community's ability to learn from disaster may depend on the extent to which decision-makers and community members perceive future risks of disaster as significant to call for policy change. The extent to which these individuals and organizations experience and perceive a disaster as severe may influence how they perceive future risks and their preferences toward policy solutions (Brilly & Polic, 2005; Wachinger, Renn, Begg, & Kuhlicke, 2013). All of these factors combine to influence the learning and policy change observed within disaster-affected local governments from Colorado's 2013 floods. Chapter 2 introduces the floods and the setting for understanding community-level learning toward resilience.