

PART I

Introduction

The second week of September 2013 began as many late summers do in Colorado, with a baking sun and dry weather. Those “unseasonable” days are more common than they once were (Bianchi, 2019a). The *Denver Post* described a changing Colorado climate, saying, “Changes to the climate have potentially suppressed recent September snowfall and expanded summer later and later” (Bianchi, 2019b). The changing climate in Colorado and across much of the western United States makes drought a perennial hazard and wildfires an urgent concern for residents and policymakers (Merzdorf, 2019). Less discussed by journalists, elected officials, and Coloradans is the threat of flooding that has also grown under a changing climate (McMahon, 2018).

In 2013, communities nestled along Colorado’s Rocky Mountain foothills and metropolitan corridor changed dramatically when struck by extreme floods. These floods caused loss of life and damaged infrastructure, residential and commercial buildings, and recreation and outdoor amenities. They also placed extreme pressure on the governments that had to cope with the disaster. As we look back on the floods and the recovery in their aftermath, a story emerges of lessons learned by local governments that allowed some of them to make changes that may help their communities become more resilient to future disasters.

Communities worldwide live with hazards – whether natural hazards they live with daily or human-made and technological hazards that are real but have not yet captured attention. When risks that stem from these hazards culminate in a crisis event, communities jump into emergency response to save lives and protect property. But in the months and years after the disaster passes and the influx of outside assistance recedes, communities must confront hard decisions about whether and how to rebuild. These decisions can be minor tweaks or they can involve radical changes to community planning. Whether

such changes help build community-level resilience to future risks may be linked to whether or not a community learned various lessons while managing disaster recovery.

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This book presents the story of communities faced with difficult decisions in the aftermath of disaster. The story and empirical analyses presented provide insight into what factors make disaster-affected communities more likely to build resilience during their post-disaster decisions. At the core of this book is an understanding that communities respond in differing ways when faced with a crisis. The learning that takes place after such an event may influence the extent to which a community becomes more resilient after a disaster. This book investigates factors that help explain variation in learning and resilience-building across communities.

The book discusses critical characteristics in disaster recovery and resilience-building in Colorado's flood-affected communities – factors that local governments can work to develop prior to disaster events so that they can see better disaster-related outcomes. 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. 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. Additionally, *internal community characteristics* can influence disaster recovery outcomes. These include belief systems of members of a community, as well as the scale of the disaster and the size and demographic composition of a community. Also internal to a community, risk and disaster-related *information dissemination* to the public is important during disaster recovery. 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 members' support of policy decisions of their local government during disaster recovery. The procedural dynamics during disaster recovery also matter, with *participatory processes established by local*

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governments during disaster recovery and intergovernmental dynamics and relationships with higher-level governmental authorities important to consider when applying our understanding of learning after a disaster to local governments. All of these factors combine to influence the learning and policy change we observe within disaster-affected local governments, as readers will learn in the following pages.

Part I (Chapters 1 and 2): Introduction

The book looks specifically at a set of communities affected by extreme flooding in Colorado, United States, in 2013. The chapters are structured to examine potential drivers of learning. The current part (Part I) lays out the theoretical underpinnings and potential drivers of local-level learning and resilience-building (Chapter 1). Chapter 2 then examines the case of Colorado's extreme floods of 2013, describing the event, damages, and the aftermath during the early weeks of disaster recovery. Readers learn about the event, the destruction it caused, and the massive undertaking of disaster recovery that took place once the floodwaters receded. It sets the stage for subsequent chapters that empirically assess the disaster recovery processes and outcomes.

Part II (Chapters 3 and 4): Damage and Resources

Following the discussion of a theoretical framework described in Chapter 1 and the introduction to the Colorado 2013 floods (Chapter 2, Part I), Part II details and investigates the role that variation in disaster damage and resources plays in disaster recovery. Resources, including existing capacity the local government had prior to the floods and inflow of external resources during and after emergency response, are dissected in detail. Readers learn about the capacity-building strategies that communities used and the importance of resources to successful disaster recovery.

Part III (Chapters 5 and 6): Individual Beliefs

Part III articulates the ways in which internal community characteristics influence the disaster recovery processes and decisions made by local governments. Experience with damage from the most recent

disaster, along with perceptions of problem severity and future risk perceptions can influence the degree to which residents view disasters as an increasing and urgent problem for their local governments to manage. Finally, the nexus of local government information dissemination and participatory processes (covered in Part IV) established during disaster recovery can serve two important roles: (1) garnering support for local government action and trust in government decisions, along with (2) incorporating a range of views beyond only technocratic experts to build innovative policy solutions.

Part IV (Chapters 7 and 8): Individual and Group Engagement

Part IV discusses the importance of relationships – within a community and with other governments – that can encourage or limit learning and resilience during disaster recovery. Important to this discussion are concepts related to the autonomy that local governments enjoy over their fiscal and decision-making affairs, intergovernmental relationships with state and federal agencies that can influence disaster recovery, and the dynamics of groups that form in the aftermath of a disaster. The degree of collaboration and dependence involved in intergovernmental relationships shapes the extent to which these relationships aid communities during disaster recovery. Part IV similarly presents characteristics of groups of stakeholders that form within communities to advocate for policy changes, which can influence whether a disaster-affected community initiates changes in the wake of a disaster.

Part V (Chapters 9–11): Connections, Conclusions, and Recommendations

As this introductory part argues, disasters are fundamentally policy related. Disasters affect communities globally and those events are expected to increase in the future under current climate and human development scenarios. Local governments are the first line of disaster response, but also bear the burden of performing long-term disaster recovery and planning for future events. And yet, scholars do not have a clearly articulated framework for understanding if, how, and with what effect local governments learn after a disaster strikes their community. The framework of community-level learning after disaster

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presented in Chapter 9 synthesizes the previous chapters and the disaster scholarship to develop a picture of what characteristics are necessary for a community to navigate a disaster and come out of that experience with greater resilience. Chapter 10 builds upon the analyses presented in the prior chapters and applies those findings to other cases in the United States and globally. This chapter illustrates that the various community-level characteristics and intergovernmental dynamics detailed in Parts II–IV are important for disaster recovery and resilience-building at the community scale beyond the floods in Colorado. Rather, after disaster, emergency managers, scholars, and policy experts observe similar factors that aid in successful disaster recovery and resilience-building. This final part concludes the book by providing a set of recommendations for practitioners to plan for disaster recovery and build community-level resilience.

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Deserai A. Crow , Elizabeth A. Albright
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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-foot-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).

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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