

Chapter 1

Introduction to the Book: “Ahead of the Curve”



Shirley Laska

1.1 Louisiana: A *Whole State* with Extreme Weather Challenges

The coastal areas of Louisiana have been subject to extreme weather ever since the Mississippi River began to create the Delta land 7000+ years ago (Roberts 1997). The extreme weather first impacted the indigenous population that has lived here for millennia and, over the last 300+ years, multi-ethnic immigrants, refugees and enslaved peoples who settled among them (Owens 2015). While inland floods have occurred intermittently over the decades, the two very extreme rain events in the spring and summer of 2016 began to change the framing of the state’s extreme weather experiences: No longer was Louisiana two “states” – the coast subject to extreme weather effects . . . and a safer inland. The image of the state in the eyes of government entities, of inland riverine residents, was changing, and likely observers from outside of the state were also seeing the state differently: It is now a state subject to extreme weather *throughout* – urban, rural, coastal, and inland watersheds. And that extreme weather is exacerbated by climate change. Weather specialists declared that in Louisiana, both Hurricane Isaac in 2012 and the summer 2016 inland storms were enhanced by it – stalling the storms’ advance and thus generating their extreme precipitation effects (Wiel et al. 2017; Peterson et al. 2016; Kossin 2018).

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When these inland floods occurred, it became evident to this book's editor – a researcher and adaptation¹ practitioner studying Louisiana flood risk for about 35 years and having begun research on an inland flood of 1983 – that sadly, the whole state had now moved into an extreme weather state category. I believe this change warrants study of Louisiana *as a unit*: examining and understanding better the level of experience and response embodied within the geographic/political entity of an American state and its government bureaucracies, its communities and citizens. It is hoped that this research will benefit both Louisiana and – as an exemplar – other states, whose extreme weather risk is increasing like Louisiana's has done or is likely to increase in the near future as the new US Global Change Research Committee Report (Jay et al. 2018) portends.

The timeliness of a *statewide* “extreme weather” book became quickly obvious when state and local officials initiated after the 2016 floods adaptation programs additional to those focused only on the coast. As the book took form, some eight state extreme weather adaptation programs and one city program began to take shape. Also, adaptation as reflected in the new programs was no longer siloed in one or another relevant state agency. The watershed program was created and implemented by five state agencies, and the coastal restoration's community/parish capacity and capability study approached the project so that the findings could be shared with the watershed program and possibly expanded statewide (see Sect. 1.3.1). The evolving programs demonstrated an appreciation of the interconnectivity organizationally and experientially of the challenges for the whole state. The “connection” had been made between coastal adaptation and inland adaptation to begin to grow *statewide* adaptation as the goal.

This chapter has the following aims:

- 1.2 Introduce the key Louisiana extreme weather and climate-change induced conditions that prompted the preparation of this book as well as demonstrate *adaptation* and *adaptation risk* to Louisiana's most current extreme weather and disastrous flood levels of the Mississippi River, which are likely climate change-enhanced threat.
- 1.3 Summarize the recent adaptation programs that have been created within the state. Then argue that an effective way in which climate-induced extreme weather adaptation can occur in the earlier stages of this climate adaptation phenomenon is through existing federal disaster recovery programs – as the new Louisiana programs are currently being funded. How to achieve climate adaptation through this means is diagrammed, and the details are presented. The process of *exceptional recovery* from disasters if successful results in *essential resiliency* – resiliency embracing “just,” comprehensive qualities – and “grows” climate change adaptation.

¹Climate change *adaptation* is adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change (Burton et al. 2001). Climate change *mitigation* refers to actions that reduce the human contribution to the planetary greenhouse effect (National Climate Assessment 2014).

- 1.4 “Place” the book’s chapters about Louisiana as expanding the exceptional recovery/essential resilience model; about one-half of the chapters directly address one of the two very related concepts. In addition, four chapters describe/expand the topic of Louisiana’s new adaptation programs and are identified in Table 1.1. Finally, the chapters which analyze challenges of *traditional disaster recovery* will be identified because these challenges will only be exacerbated by climate-induced extreme weather events and thus must be appreciated and their solutions addressed. It is critical not to split the challenges and solutions to traditional disaster recovery from those that are emerging from climate-induced extreme weather events.
- 1.5 End the chapter with a challenge to the readers: Will the recommendations offered by the chapter authors for extreme weather adaptation be more successfully accomplished and achieve their goals if the states/communities – *subnational* units of government – are the true managers of the adaptation process instead of the federal government which is emphasized at present? While the consideration of community adaptation has been embraced in the twenty-first century (Burton et al. 2001; NASEM 2018; Rockefeller n.d.), it is argued that the technical aspects and especially the financial aspects of turning from federal management/control to state and local units have not been adequately considered. Therefore, I propose that shifting to subnational levels is not adequately informed if these real issues are not considered and addressed. This section will offer considerations –both pro and con– for this change to subnational adaptation emphasis and encourage robust research to achieve the critical “essential” adaptation success needed.

1.2 The Louisiana Case: Extreme Weather and Climate Change Experiences

The state of Louisiana’s twenty-first-century flood inundation is represented by nine individual extreme storm maps that were combined to create the composite map (Fig. 1.1). In addition to the 9 storms represented in the composite map, another 14 storms occurred that caused additional flooding, mostly within the same areas as the 9 storms represented (see Appendix 1 for the full list). No such map as the composite in Fig. 1.1 was available for use in this book; it had to be constructed. Not to have state-level composite maps that are kept up to date and readily available for researchers, practitioners, and government officials, especially for states subject to so much extreme weather flooding, is a significant gap of needed information for addressing extreme weather events and adaptation to them. (See Appendix 1 for expanded description of the types of data used for the included maps, the methods of map creation, and the recommendations for enhancing map resources.)

The majority of Louisiana floods can be traced to 54 tropical weather events, the third largest number that impacted a US state within the last 166 years. Texas (64) and Florida (117) are the only two states with more (National Hurricane Center

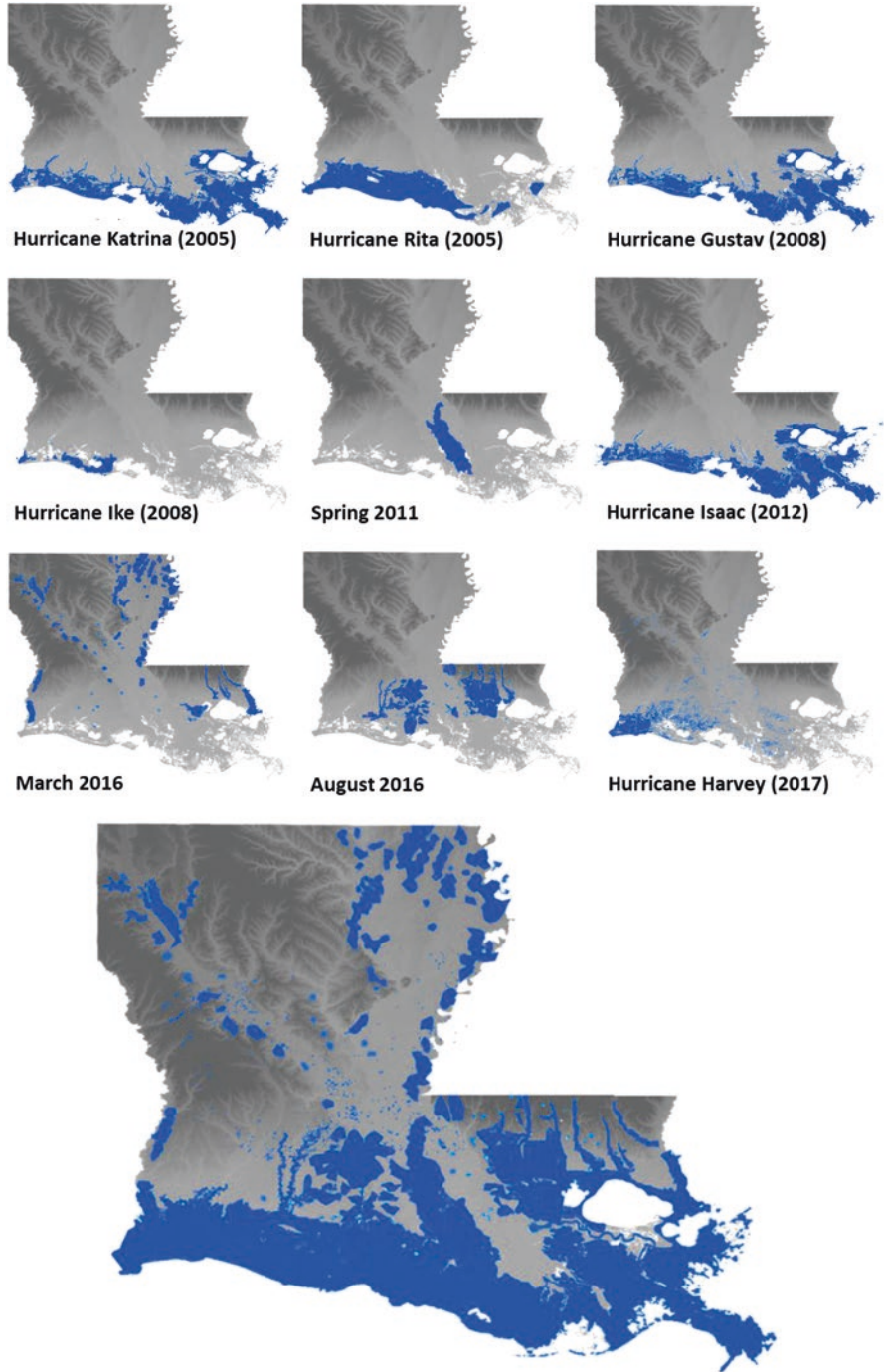


Fig. 1.1 Flood inundation coverage maps for selected hurricanes and intense rainfall events in Louisiana during the twenty-first century (top) and composite flood map (bottom)

2018). The inland flooding that prompted the creation of this volume (spring and summer 2016 and December 2018) set river records for flood levels that ranged from 15% to 30% higher than previous records that were set as far back as up to 66 years ago (Schleifstein 2019).

The most serious hurricane experience for Louisiana was Hurricane Katrina in 2005, the deadliest and costliest of mainland US storms ever (NHC 2018). Climate change-related qualities of very warm Gulf of Mexico waters and increasing sea level rise (Union of Concerned Scientists 2017a) exacerbated the storm’s impacts, especially the significant storm surge that the public was not warned of adequately because it was not included in the Saffir-Simpson scale.² Unfortunately Katrina became a “perfect storm” due to these storm and atmospheric qualities combined with weak storm protection (Day et al. 2007), and an ill-conceived ship navigation channel cut through the marsh directly targeted to New Orleans (Freudenburg et al. 2009).

Louisiana is also ranked number one in two other extreme conditions – coastal land loss and sea level rise. Coastal Louisiana was built from sediment suspended in Mississippi River waters flowing down the continent that was deposited in fanlike patterns as the river swished back and forth on the Louisiana coastline that began at the border with the Pleistocene uplands (see Fig. 2.2 in Boesch). However, levees built by early settlers and strengthened after the massive 1927 flood restricted the continued capacity of these depositions to replenish the marshland created by the earlier flows (Couvillion et al. 2011). Resulting marsh subsidence and erosion are exacerbated by saltwater intrusion into the marshes via the thousands of canals created over more than a century of oil and gas exploration (Turner and McClenachan 2018; DeLaune and Pezeshki 1994). Saltwater intrusion via these canals kills the grasses and other plants that hold the marsh soil, resulting in more soil eroding into the water and being washed out into the Gulf, thus causing land loss. Since 1932, approximately 2000 square miles of coastal Louisiana have been lost (Couvillion et al. 2011).

Relative sea level rise is predicted to be higher in the coastal Mississippi Delta than anywhere in the world by the end of this century (Parris et al. 2012). This is the result of the subsidence just discussed combined with *eustatic* (global) sea level rise (Rovere et al. 2016) caused by increasing freshwater input and temperature-induced thermal expansion of the world’s oceans (Pahl 2016). New measurement techniques identify even more sea level rise on the Louisiana coast than earlier described (Keogh and Tornqvist 2019). The ramifications of such an increase in elevation of the Gulf of Mexico waters along coastal Louisiana are demonstrated by the dramatic number of Louisiana communities expected to be chronically inundated by 2035 in the intermediate sea level rise scenario: some 59 Louisiana communities, including New Orleans, comprise two-thirds of the 91 US communities coast-wide predicted to be so harmfully affected (Union of Concerned Scientists 2017b) if the state’s

²The Saffir-Simpson scale failed to adequately consider the powerful storm surge caused by Katrina. Seven years later surge measurement was added to National Weather Service forecasting tools (National Weather Service 2012).

coastal restoration efforts are not adequately funded (Davis and Boyer 2016), implemented, and effective.

Finally, as this manuscript is being submitted to Springer in early summer, 2019, the Mississippi River is in the midst of the longest period of high-flood stage in the history of its flood measurement and has surpassed the duration of the 1927 flood (from midwinter expected through midsummer). This event has been caused by extreme storm patterns in the upper Midwest resulting in record-breaking flood elevations all throughout midcontinent rivers that feed the Mississippi. The extremeness of the patterns is suspected to be caused by climate change (Stott 2016). Discussing this particular example of Louisiana extreme weather risk provides the bridge between the just-described presentation of Louisiana's frequent and severe storms via the twenty-first-century storms and *adaptation*, including *adaptation risk*, the two concepts that are the focus of this book.

There are three foci of the protection, i.e., adaptation, which the Corps of Engineers provides to Baton Rouge and New Orleans beginning upriver: the Old River Control Structure(s), the Morganza Spillway, and the Bonnet Carre Spillway. The first maintains the percentage flow between the Atchafalaya Basin and the current Mississippi River channel of 30/70%. Without it, the percentages would reverse, and the two Mississippi River cities would no longer be able to support ocean-going ships and river commerce as it is known today. Due to the extreme importance of this structure remaining intact and providing that service, improvements were made to it in 1973. The Morganza Spillway reduces flood levels for Baton Rouge and relieves flood level pressures on the Old Structure. Finally, the Bonnet Carre permits the Corps to maintain the river below flood stage at New Orleans. Thus, these adaptations serve the goals for which they were designed.

However, the diversions pose *adaptation risks* to the floodways through which the diverted water flows; and it appears very clearly that with frequent and extreme weather events, the risks which these adaptations pose to other communities and livelihoods become disasters in their own right. The harmful impact of the two diversions is on (1) the Atchafalaya Basin (the Morganza Spillway) and (2) Lake Pontchartrain and the Mississippi Sound (the Bonnet Carre) as released water from the latter passes through the lake to the Gulf of Mexico.

Both spillway paths have been "threatened" by this year's high water. While the Corps of Engineers announced a date for the Morganza Spillway opening, it postponed it three times and then postponed it "indefinitely" when this manuscript was going to the publisher; but it is known how the opening would have impacted the spillway from the opening in 2011, only the second in the spillway's history. What is at risk if the Morganza is opened are parts of western Terrebonne Parish, parts of Morgan City, and the Atchafalaya crawfish harvest, rice, sugarcane, cattle farming, and wildlife. Similarly, the Bonnet Carre silted and freshened (added freshwater to brackish) Lake Pontchartrain and, especially harmful, freshened the Mississippi Sound where the freshwater infusion has put at extreme risk the oyster harvest, dolphin and sea turtle populations, and tourism through these wildlife mortalities. Public meetings of community leaders and commercial fishing organizations seeking redress of this harm occurred in late May when the impacts

became clearly evident. Newspaper headlines tell the story: “Waveland (MS) ‘first in line’ for damage from opening of the Bonnet Carre,” and “Fisherman outraged by freshwater impact on the Mississippi Sound.”

At a public meeting, May 29, 2019, near Biloxi, MS, the attendees wanted first to describe the *layering* (Laska et al. 2015) of earlier event impacts that they had experienced – beginning with the BP oil spill and the opening of the Bonnet Carre the earlier time this year (and the third in 4 years) upon which they declared that the current adaptation measures to protect Louisiana river cities posed additional (adaptation) risks to them. They clearly perceived the adaptation event as being so harmful because it came on top of the other events in addition to being a serious event itself, i.e., compounding harm. Although adaptation has been represented as a positive, constructive concept when used in the conversation of climate change, equally important is the need to understand better that adaptation is not a concept free from doing harm and that harm likely increases with the magnitude of climate change. Considering adaptation risk is undertaken in several of this book’s chapters: especially Chaps. 3, 5, 6, 7, 8, and 9.

Louisiana’s extreme weather history and its predicted future of extraordinary risks – this book does not even include heat waves and droughts that appear also to be in the future of Louisiana – place the state “ahead of the curve” in experiences and thus make it a “poster child” for understanding climate change impacts and for learning about and improving adaptive responses. Extreme weather affects 4.5 million Louisiana residents – rural as well as urban (25/75% population distribution) and coastal as well as inland areas (60/40% population distribution). It impacts a wide variety of communities, cultural groups, and economic activities, both local and national, including farming, ports, fisheries, and tourism, which employ the state’s residents. Additional impacts are found in oil and gas extraction/petrochemical production whose normal operations present the state with environmental risks – making their threat even more serious when impacted by extreme weather.

1.3 Framing Climate Change-Induced Extreme Weather Adaptation

It would be better to consider and to implement adaptation to climate change-induced extreme weather in a methodical fashion, separate from immediate disaster recovery and separate from uncertainties and fluctuations in funding, with the proposed critical changes from previous extreme weather response clearly identified and included in the societal adjustments to extreme weather. It would be ideal to refine systematically the adaptive responses applying the results of careful climate change social, physical, and atmospheric scientific research and engineering/design and include more than one method in the same effort after considering the compounded benefits (Bailey et al. 2017). What is different with climate change dynamics taking all major vulnerability dimensions into consideration? How is it different? What has caused the differences? What differences will bring the most

harm to the social structure, to the social processes, and to the residents as well as the land and ecosystem? How rapidly will these changes occur? What are the differences: magnitude, frequency, and changes from past extreme weather events such as slow-moving storms when they had moved more rapidly in the past? Who is at risk, more than before the extreme weather-induced changes occurred? How can the identified useful adjustments be made economically, with deliberate speed, to protect the largest number of communities and widest array of residents, especially those most vulnerable, and to protect them for the longest time into the future? How can adaptive capacity (Gitz and Meybeck 2012) be enhanced with the new responses? And, of course, how can the adaptation occur while not harming others and other ecosystems?

I believe that those considering what climate change will bring – be they citizens or specialists – are naively assuming that such an adaptive response will likely happen. If a challenge is seen, it is in understanding the likely changes and synching our response successfully with them and in motivating the society to take the necessary adaptive steps. Our society does not raise concerns that the response will not occur as we do about the *mitigation* of CO₂ gases, the other response believed to be absolutely necessary in addressing climate change. With the new weather changes, it is believed that new adaptive responses will be determined and implemented. “No problem” as the younger generation likes to say. On the contrary, the chapter content in this book and the new adaptation programs which Louisiana has introduced within the past few years assert that *both* climate adaptation and mitigation pose huge challenges to achieve success.

1.3.1 Louisiana Adaptation Innovations and Proposed Early Climate Change Response³

Eight climate change-related adaptation programs came into existence and evolved during the conceiving and preparation of this book (Table 1.1 and Appendix for agency descriptions of each). This was an increase of eight from only two evident programs of significant size before that time and the beginning small steps of the nonstructural aspects of the Coastal Master Plan, which is a substantial amount of growth. Previous programs included the environmental and physical structural efforts undertaken by the Louisiana Coastal Protection and Restoration Authority (LA-CPRA) entitled the *Louisiana’s Comprehensive Master Plan for a Sustainable Coast* (Coastal Master Plan) and, one combination of structural and human dimensions, the Community Rating System (CRS) of the National Flood Insurance

³Andrea Galinski, Assistant Scholar, Dept. of Landscape Architecture, College of Design, Construction and Planning, University of Florida, had intended to contribute a chapter to this volume on the topic of new adaptation programs but was unable to do so due to a career change from LA-CPRA to Florida. However, she enthusiastically volunteered to offer her assistance with this section. I am appreciative of that willingness.

Table 1.1 Large, new (since 2016) LA state and local adaptation programs being implemented currently

Locale emphasis	Description (URL citation)	Govt. unit/program/funding
Coastal	1. Coast-wide wetlands and barrier islands restoration efforts with <i>addition of Flood Risk and Resilience Program</i> (CPRA 2017) (<i>Hemmerling et al., in this book</i>) (<i>Birch and Carney, in this book</i>)	LA Coastal Protection and Restoration Authorization (LA-CPRA)/2nd 5-year Master Plan/multiple federal and state sources
	2. Awarded Purpose (since modified): Resettlement of Isle de Jean Tribe of Biloxi-Chitimacha-Choctaw (La. Div. Admin. 2015; 2019, April 23) (<i>Jessee, in this book</i>)	LA Office of Community Development (OCD)/Natl. Disaster Resilience Competition (NDRC)/HUD-CDBG-DR
	3. Gently Resilience District Storm Water Management Project funded for major project implementation of the Greater New Orleans Urban Water Plan developed during the decade (New Orleans 2019) (<i>Birch and Carney, in this book</i>)	City of New Orleans, Office of Resilience and Sustainability (ORS)/ Natl. Disaster Resilience Competition (NDRC)/HUD CDBG-DR
Inland	4. Resettlement of Pecan Acres subdivision, New Roads, near False River and Silverleaf, City of Gonzales (La. Div. of Admin. 2019, March) (<i>Peterson, in this book</i>)	LA Office of Community Dev. (OCD)/Buyout and Resilient Housing Incentive. CDBG-DR from 2016 flood/2017 and Natural Resources Conservation Service, USDA
Both	5. LA SAFE. Determination of 3-tiered coastal areas risk– remove structures, elevate, settle, and parish engagement model projects to respond (La. Div. of Admin. 2019, April) (<i>Birch and Carney, in this book</i>)	LA Office of Community Development (OCD)/Natl. Disaster Resilience Competition (NDRC)/HUD-CDBG-DR.
	6. Adaptive capacity for resilience of coupled coastal-inland system (LSU-CSS 2017) (<i>Birch and Carney, in this book</i>)	LSU-Coastal Sustainability Studio/ NAS Gulf Research Program and Robert Wood Johnson
	7. Framing riverine flood management using watersheds (Office of the Governor 2018) (<i>Birch and Carney, in this book</i>)	Office of the Governor/Watershed Initiative /CDBG-DR from 2016 flood
	8. Parish flood risk and resilience capability and capacity assessment (CPRA 2018)	LA CPRA/Flood Risk and Resilience Program evolved to support CPRA nonstructural and the watershed Initiative/multiple federal and state sources

Program (NFIP), a voluntary program for recognizing and encouraging community floodplain management activities that exceed the NFIP’s minimum standards. While, as the title denotes, the Coastal Master Plan focused on the coastal storm and sea level rise, the participating Louisiana CRS communities, some 43 in number, are scattered throughout the state but still mostly in the coastal areas (FEMA 2018b).

There is likely limited data from other states with which to compare the large number of new programs created so close together by Louisiana state agencies and one community. The emergence of such a number within a 4-year time span suggests with little doubt that the different state government agencies, and the largest city, New Orleans,⁴ have been recently rapidly growing in their appreciation of the need for extreme weather adaptation. The recent 2016 floods, which damaged 146,000 homes and amounted to approximately \$10 billion in economic damage, have likely contributed to reframing adaptation efforts away from a coastal focus alone to a statewide need and effort. The following are (1) a summary of these programs, (2) the description of one for which there is no analysis in chapters contained within this book, and (3) the challenges of such a “surge” of efforts occurring approximately at one time. These topics, it is hoped, will contribute to understanding what we can expect in other areas as they experience more climate change-related impacts or how we can contrast what Louisiana is doing with what other states, communities, and regions of the country are currently undertaking to grow in adaptation knowledge and best practices.

The Louisiana programs are distributed among coastal, inland, and a combined emphasis (Table 1.1). Three of the programs are as would be expected coastal programs, one is specifically inland, and four are both coastal and inland or “coupled” coastal-inland systems. It may be hypothesized that the coupled are likely to be the most fruitful – as is considered in Birch and Carney, Chap. 12, and Peterson, Chap. 7, in this book. However, more research needs to be done on this concept before more knowledgeable assessments of coupling can be described and even better refinements made.

The organizations which created the new adaptation programs range from the state’s coastal agency – La Coastal Protection and Restoration Authority (which includes several programs and initiatives – Coastal Master Plan, Flood Risk and Resilience Program, and the Parish Flood Risk and Resilience Capability and Capacity Assessment) – to the agency which manages disaster response, the Office of Community Development (OCD) (three programs – Community Resettlement from the National Disaster Resilience Competition, the LA SAFE program similarly funded to engage and encourage communities and parishes experiencing different gradations of risk from the coast inland to adapt appropriately, and the the inland resettlement of two neighborhoods) to the Governor’s Office (Watershed Initiative) and to Louisiana State University’s Coastal Sustainability Studio’s adaptive capacity for resilience of coupled coastal-inland systems.

This volume was not intended as an analysis of only new adaptation programs (as the programs did not exist/or exist in their current complexity when the book was conceived), but rather it has evolved to describing them and then benefitting from various chapter authors analyzing critical issues of the programs that impact adaptive behavior (see Table 1.1 for the specific chapters that address the various

⁴The work on effective water management began after Hurricane Katrina. The program mentioned herein is an area-wide implementation of the ideas developed since that catastrophic event, especially after 2010.

programs). Further research it is hoped will also be taken up by others, including further research by the contributing authors of this book’s chapters. These programs are, in effect, Louisiana’s “testing ground” for its climate-induced extreme weather response.

Only the newest program, and one thus not described by the authors of the chapters, will be described as an example of where the state’s adaptation efforts stand at publication of this volume after which there will be a beginning analysis of what happens when eight adaptation programs are “gestated” at about the same time. Obviously, the opportunity to follow these programs, to consider if and how they are blending, complementing one another, and defining different areas of need and of professional specialty, is a font of opportunity for those interested in climate change adaptation research.

A number of Louisiana’s new programs for responding to climate change-enhanced extreme weather have evolved out of the state’s 2017 Coastal Master Plan, which includes recommendations for restoration projects, structural projects (like levees and floodgates), and nonstructural flood mitigation projects (such as home elevations or voluntary acquisitions) across the Louisiana coast. The 2017 Master Plan provides a comprehensive assessment of how coastal storm surge-based flood risk may change over the next 50 years, as well as offers recommendations on where and to what extent nonstructural efforts would most benefit the resiliency of coastal Louisiana. (The plan recommends approximately \$6.2 billion in nonstructural mitigation measures in multiple communities over the next 50 years.)

Importantly, the Coastal Master Plan shifts the state’s focus from post-disaster storm recovery to planning for proactive flood risk reduction actions. In addition to these mitigation project recommendations, the 2017 plan also lays the groundwork for a state-led program that can better align federal, state, and local funding to advance the implementation of such projects. The aim of CPRA’s Flood Risk and Resilience Program is to prioritize areas for nonstructural mitigation and to develop a state-led grant program that supports the implementation of such projects by parishes. The program encourages resiliency actions across a range of state, parish, municipal, and academic/NGO actors through a suite of resiliency policy recommendations. Building more resiliently is also encouraged through funding incentives for increased flood risk standards with up to 100% of a nonstructural mitigation project potentially funded by the state. The program also more broadly aims to advance awareness of current and future flood risk, promote greater inter-agency coordination, and provide resources to build local capacity.

One recent initiative developed under the Flood Risk and Resilience Program (Table 1.1, #8 program) includes the development of a capacity assessment for coastal and near-coastal parishes to better determine their ability to implement nonstructural projects as well as related plans and policies. Andrea Galinski, a former CPRA long-term staff member, explained:

We wanted to better understand what the current ability is to implement nonstructural projects (and broader resilience/flood risk reduction plans and policies). A capacity assessment was also going to be part of a broader Watershed Initiative across the state, and so this assessment was slightly modified and became framed as a “pilot” that could be used for that effort. (Personal written communication, May 10, 2019)

Galinski also notes that this capacity assessment has helped CPRA to better understand the existing gaps and local needs and has also been informative to other state agencies involved in watershed assessment including the Louisiana Department of Transportation and Development (DOTD), OCD, Governor’s Office of Homeland Security and Emergency Preparedness (GOSHSEP), and the Department of Natural Resources (DNR). One important lesson that emerged from the assessment included parishes’ concerns with state coordination and actions, which has led to a significant consideration of how state agencies can better coordinate both horizontally (across state agencies) and vertically (between federal and local levels) to reduce flood risk.

What should be the initiation and implementation of a state-level movement toward addressing a “new” problem – in this case extreme weather risk likely associated to climate change and now being experienced by residents throughout the state? Is a flurry of programs the usual way change happens? And then they begin refining their missions, synching their goals, some achieving institutionalization while others fall to the wayside. There is a lack of clarity about if/how these eight human dimension programs will synch. It is not known that they will. Will some be redundant but still stay in existence? Will they expend resources while not achieving the needed integrated framing and implementation of the best adaptive efforts? That the answers to these questions are not known is likely very “normal” for such moments of crisis and a beginning of a broader society push to address serious risk.

However, these and similar questions are being asked about the evolution of this now “macro” adaptation response. Local WWNO public radio reporter Travis Lutz (2019, May 26) queried the director of the La. Office of Community Development with such a question about yet another program, the LA SAFE Program (#5 program in Table 1.1). The director of the Office of Community Development replied: “It is about a new way of thinking about investments we make every day. . .” There is no doubt with all of the energy, new bureaucratic structure, program content, and efforts to identify a path forward that Louisiana is in the midst of a “sea change” in adaptation. Only time and committed research will tell those interested if and how the state succeeded and what can be learned by other states from Louisiana’s responses, successes, and failures.

1.3.2 Today’s Reality of Climate Change Adaptation

To reiterate, all eight Louisiana significant innovative adaptation projects were, or will be, funded as a result of a specific declared disaster: seven extreme weather and the eighth the Deepwater Horizon oil spill. Given that “tie” to a specific disaster, there is no reason to believe at this time that adaptation innovations will occur regularly, in large numbers and at great investment expense separate from a disaster’s recovery funding, its damage legacies. Much effort and resources will have to be invested over a long period of time, and social change occur in major ways so that continual successful adaptation takes place. The reason for such a strong negative assessment by this author to the likelihood of stand-alone adaptation is due to the

current resistance to implementing “normal” (not climate change induced) extreme weather resilience efforts. Louisiana is a case in point but unfortunately not one out of the ordinary for US states. It is “nestled” within the norm: there has been very little appetite in Louisiana and in other states for stand-alone extreme weather resilience efforts, traditionally called “pre-disaster mitigation” by FEMA (The Pew Charitable Trust 2018a, b).

Extreme weather adaptation typically occurs during the recovery period *after* major disasters strike (The Pew Charitable Trust 2018b) as in the seven Louisiana examples offered in this chapter. While “pre-disaster flood mitigation” is a term embedded in the vocabulary of the Federal Emergency Management Administration (FEMA), commitment to adapting to an extreme weather threat *before* another weather event occurs in a particular location is currently qualified as “aspirational,” as indicated by the modest number of successful awards in FEMA competitions for states, the small amount spent by state governments, their lack of interest in collecting data that would measure such pre-disaster mitigation effects (The Pew Charitable Trust 2018a, b), and the modest interest in the FEMA Pre-disaster Mitigation Program. Louisiana is no exception. For fiscal 2017, the latest year data are available, Louisiana did not receive any funds from FEMA for pre-disaster mitigation (FEMA 2018c).⁵

While there are some new pre-disaster funding opportunities within the new Disaster Recovery Act of 2018,⁶ state and local governments are currently challenged to compete successfully and then to implement such systematic adaptation now (The Pew Charitable Trust 2018a). Therefore, if pre-disaster mitigation has not happened much to date with extreme weather disasters, how rapidly and successfully will these funding enhancements lead to significant increases in pre-disaster adaptation in the future? While some of the qualities of the new climate change extreme weather might prompt more pre-disaster adaptation – such as increased magnitude, frequency, clearly observable difference from earlier extreme weather – that link has yet to be studied and, if found to be the case, may not occur repeatedly for quite some time. As the data in the beginning section of this chapter demonstrated, Louisiana has been subject to extreme weather events on the average of more than one a year since the beginning of the twenty-first century. This rate of impact has not motivated the state to successfully compete for pre-disaster mitigation funds as mentioned above (FEMA 2018c). Now there appears to be changes in that response, but the efforts are still being funded by resources tied directly. Research needs to be conducted specifically on this question: Does a significant number of disasters, or continual events, or extreme ones not experienced before or for a lengthy time motivate states to seek pre-disaster mitigation (adaptation) funds more frequently and to successfully qualify for them? If the results of such research lead to the

⁵The disposition of those submitted fell into categories: identified for further review, did not meet hazard mitigation assistance requirements, and not selected.

⁶Improvements in support of pre-disaster implementation for resilience include a reliable stream of 6 percent set aside for public infrastructure pre-disaster hazard mitigation (Section 1234) (FEMA 2018c).

answer “No,” then even more concern must be expressed about our culture’s assumption that climate change adaptation will be significantly forthcoming. Right now, we should assume that the challenge to adapt prior to disasters will be equivalent to the challenge to mitigate CO² emissions.

It may be that the effort needed to recover from *particular disasters* or *catastrophes* such as Katrina consumes the citizens’ efforts and emotional energy such that interest in continual adaptation is just too much. Or the motivation to adapt is strong while recovery is going on but it fades afterward. Meyer and Kunreuther’s recent work (2017) tries to explain these barriers suggesting social psychological causes, i.e., emotions, which discourage commitment to adaptation: myopia, amnesia, optimism, inertia, and simplification of threats and thus responses. The science to explain resistance to constant attention to addressing risk needs considerable additional refinement. And the addition of the qualities of climate change extreme weather – new magnitude, sudden, more frequent, unusual qualities,⁷ having both temperature extremes in same event and more media coverage – will also add new dimensions to the needed research. It may be that these qualities will somewhat overcome the impediments to adapt described by Meyer and Kunreuther (2017). They are dramatic, “never have happened before,” and extremely damaging, and those qualities beg for attention to a response.

However, given this lack of commitment *now* to continual extreme weather adaptation absent a significant disaster event to draw attention to the topic, I argue that a resiliency framing that focuses on what adaptation is possible in the recovery from a *particular disaster* is the more appropriate focus for this early climate change extreme weather adaptation period, to make these recovery funds as productive as possible in achieving adaptive recovery, rather than merely addressing recovery as putting it back the way it was.

Two new emphases of the Disaster Recovery Reform Act of 2018 (FEMA 2018b) commit to enhancing resilience during the disaster recovery: Section 1235a ensures the Hazard Mitigation grants must “increase resilience to future damage, hardship, loss or suffering” (Section 1235a) and that damaged public facilities be repaired to the latest codes and standards to strive for resilience (Section 1235b). In the spirit of these new federal “commitments,” I will now describe a revision of a recovery framing that was first offered in an earlier publication (Laska 2012) to reflect the argument that disaster recovery must be the locus *currently* of much climate change adaptation.

⁷A Louisiana example reinforces the qualities of unusualness of weather events that bring residents’ attention to climate change: On December 29, 2018, as this chapter was being prepared, inland flooding occurred in some of the same area flooded by the 2016 spring and summer floods. Television news reporting quoted a victim: “We didn’t have any time to prepare for the flooding because what happened in 24 hours in the spring of 2016 happened within a few hours this time.”

1.3.3 *Exceptional Recovery for Essential Resilience*

The extreme weather adaptation frame offered here combines two concepts – *exceptional recovery* and *essential resilience* (Laska 2012).

The *exceptional recovery process* has qualities that have been identified and developed by the authors of this book’s chapters. The recovery process must:

- Be based on a robust commitment to citizen participation
- Honor community self-determination of recovery processes and outcomes
- Have a deep commitment to social justice in the recovery processes at all levels of government response
- Expect a sophisticated recognition by government officials of historical experiences that have led to socially constructed vulnerabilities “causing” the current disaster impacts (Tierney 2014; Wisner et al. 2004)
- Appreciate the economics of the recovery process itself that do not support the enablement and adaptation of the entire community to future extreme weather but rather the interest of the corporations that are used to address the damage and of the “growth machine” (Molotch 1976) putting developer interest ahead of community residents
- Have a deep understanding of the institutionally induced harm that manifests itself in the current government-managed recovery including the technocratic framing of disaster funding as dependent upon benefit/cost and to develop recovery processes that are free of such harm

Without such a robust understanding, the recovery process will contribute to reproducing the vulnerabilities that caused the extreme weather event to generate harm in the first place through a disaster or even a catastrophe from which the community or region is now recovering.

Adding the adjective *essential* to the sought-for resilience gives consideration to the qualities of resiliency that must be part of the outcome of the exceptional recovery. The prolific array of publications that have appeared in the last couple of decades speak to the enhancing of the qualities of the society that permit it to “bounce back” or change so that the form the community/region takes after a disaster enables life to go on effectively, e.g., “resiliently.” As has been repeatedly affirmed, such resiliency extends way beyond preventing the physical event or modulating generally what the extreme weather event can do to a community physically. The use of essential resiliency in this discussion of climate change adaptation is to encourage the consideration of what qualities of a society, of a community, are *essential* to the robust improvement of the community to withstand future climate change-induced extreme weather impacts. To reiterate, it is the robust, carefully considered *essential* improvements that redound to the benefit of all social classes, races, ethnic groups, and the social organization that supports the full community’s ability to function satisfactorily that are the requirements of successful adaptation.

By using such a reasoning, sometimes the improvements that are of focus in disaster recovery can appear to have little to do directly with recovery. However, the work of the chapter authors within this volume and their like-minded researchers reminds us that resilient communities are socially and economically healthy communities with continual efforts to prevent social class, race, and ethnic disparities and discrimination. If, for example, as Andreanecia Morris and Lucas Diaz describe in Chap. 9, lower-income families in a highly hazard risk community like New Orleans are able to improve their income and/or reduce the percentage of their income spent on housing located near good employment, their resilience “when the next storm hits” rises. And if the housing they rent has the ability to be physically resistant to storm winds and water, and to be repaired after the earlier storm, their chances of returning to the community, to their social network, to their employment, and to the contribution which they made before the event are greater, and therefore the entire community is more resilient following the recovery and into the next disaster if one happens. Thus, essential resilience, the outcome of the exceptional recovery process, should be *additive with deliberation and inclusivity*. It should also recognize at its core that much disaster vulnerability is social and economic, not physical (Wisner et al. 2004).

The diagram created for the original concept in 2012 (Laska 2012) has been refined for this book (see Fig. 1.2). It visualizes the difference between the recovery from a disaster undertaken in more traditional ways – support victims in recovery, return their damaged houses to what they were before the event with minimal changes except for elevation for those damaged over 50%, and assist in the repair of the infrastructure of the community back to what it was before the storm other than

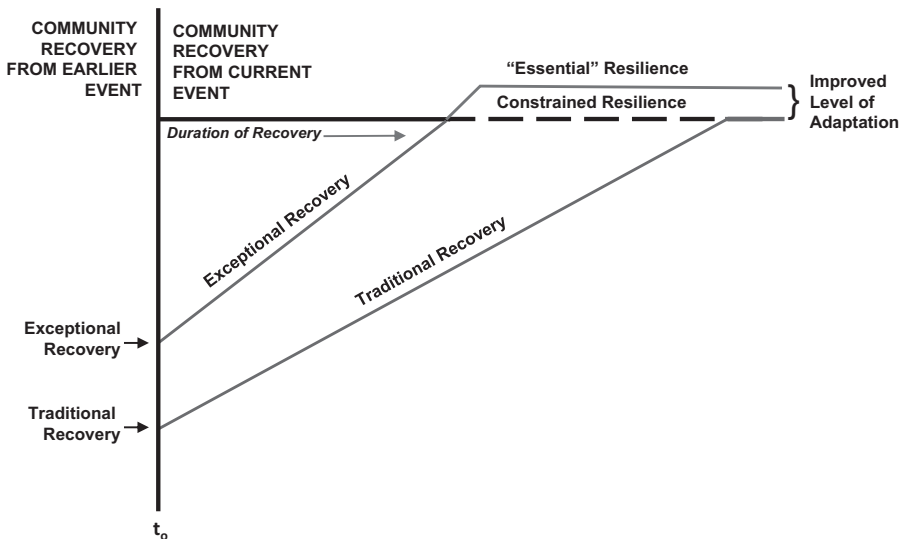


Fig. 1.2 Resilience deltas when community function is/is not enhanced by pre-event vulnerability reduction measures, i.e., adaptation. (Figure adapted from Laska (2012))

some required improvements due to code improvements. The traditional response is compared to a more adaptive, resilient approach – committing to understand both the physical and especially the social vulnerabilities and undertaking recovery approaches which adhere to the state-of-the-art regulations, community plans, land-use planning, and other resilient qualities including the best scientific knowledge of the anticipated climate change-induced extreme weather effects. Such a process is inclusive of citizens in the learning and decision-making processes.

With the *traditional recovery* being built from the last disaster recovery, the resilience that existed before a disaster will take longer to get back to, and no significant improvement will occur. With *exceptional recovery*, the recovery from each extreme weather disaster event will be more rapid, and the level of resiliency will rise to a better level because the goal will be *essential resilience* (to prepare for the possible next event). Kuhlicke and Steinführer (2010) state that the impact of these adaptations to the phase just before the next disaster, the *new anticipation phase*, would differ from the one described above, in a way that reflects learning and social change, or, to put it differently, a new hazard cycle begins which is not a repetition of the one previously experienced. It will be more resilient. And the community officials and the citizens will be developing a capacity to function adaptively in this more effective way.⁸ Diagrams such as the one contained herein help communities, states, and federal government officials and staffs to visualize the simple outline of the process and the outcome. What each level of government might contribute through the exceptional recovery process to the essential resilience goal will be considered in the last section of this chapter.

The irregularities of extreme weather events place the destruction and thus the recovery efforts in different time frames, sometimes the same and sometimes different specific locations and at different levels of disaster – the vagaries of tornado outbreaks in the upper South and Midwest being an example. These uncertain conditions require that the capacity and focused attention of the exceptional recovery be coordinated and documented by state-level or regional agencies within the state rather than only by local communities. One wants the lessons available to all communities and counties subject to a variety of extreme weather disaster events, not just the ones who have experienced a disaster in the past.

Louisiana has the Office of Community Development (LAOCD) which functions primarily as the agency administering the federal disaster response funds. It also sees itself as the state agency responsible for resiliency enhancement:

OCD-DRU manages the most extensive rebuilding effort in American history and works closely with local, state and federal partners to ensure that Louisiana recovers *safer, stronger and smarter* than before (Louisiana Division of Administration, Office of Community Development n.d.).

⁸Note: Recommending this model of a resilience process is not done ignorant of the fact that disaster occurrence is highly uncertain. Tying adaptation to disaster events may not be the best way to achieve resilience. Just to reiterate, it might produce more resilience at this time than efforts independent of extreme weather events.

Additionally, Louisiana has eight regional planning districts and an umbrella association, Louisiana Association of Planning and Development Districts (LAPDD), which declares interest in recovery and resilience (LAPDD 2018). These organizations can enhance the state's efforts to share the exceptional recovery successes.

1.4 “Placing” the Chapters into Exceptional Recovery/ Essential Resilience Framework

Can what is learned from research about Louisiana's experience make a contribution to better adaptation by those states growing in extreme weather experiences? This book represents what the American Academy of Arts and Sciences (AAAS) calls “science during crisis” (2019). All of the chapter authors and I hope that this effort adds *long-term adaptation* to the AAAS's goal for scientists and practitioners to “improve crisis response and recovery.” The crisis is climate change-enhanced extreme weather impacts.

Part I of the book includes only one chapter that very successfully blends bio/physical/atmospheric analysis with the human/social dimensions of extreme weather response, what is called the “coupled natural-human coastal system” (NASEM 2018). It is written fully in the spirit of the goal that the book honor transdisciplinary research and analysis. Donald Boesch, a native Louisianan with a national reputation for bioecological oceanographic research, academic environmental science management, and environmental policy focused on climate change adaptation, has honored the transdisciplinary goal with a fully integrated discussion of Louisiana's growing extreme weather challenges and their effects on and response by communities and residents of the state.

The chapters in Part II consider methods (exceptional recovery) of achieving successful essential resilience and what challenges are/have been encountered with the efforts undertaken. Chapter 3 by Zachary Lamb is about the force of in the process of recovery planning, specifically the role of representing seriously flooded neighborhoods as green dots on widely publicized maps that indicate which neighborhoods were proposed “for sacrifice” to recovery redevelopment by turning them into green spaces for holding floodwater. The maps reinforced a politically insensitive representation of class and race privilege in the Katrina recovery planning process contributed to by out-of-town planning consultants and city development leaders. This public memory from Katrina recovery planning taints implementation of the current New Orleans Rockefeller-HUD \$141 million resiliency grant for climate change, almost 15 years after Katrina. It demonstrates that exclusion of citizen participation in recovery planning is a mistake and calls into question government legitimacy in response to one disaster and reduces the likelihood of *exceptional recovery* occurring before the next.

Chapter 4 by Kevin Gotham and Megan Faust considers the benefits and drawbacks of national versus state/local responses to extreme weather in a comparison of New Orleans after Hurricane Katrina and New York City after Hurricane Sandy.

Encompassing cases merge the combination of state/local and national efforts/policy and consider the benefits and drawbacks of each configuration. Given the expected challenges with relying on federal solutions and aid for extreme weather adaptation, especially for events impacted by climate change, such a comparative consideration and refinement of the *subnational* level are critical for future successes.

Chapter 5 by Scott Hemmerling, Monica Barra, and Rebecca H. Bond offers a very comprehensive description of the evolution of Louisiana's coastal restoration efforts. This chapter offers a picture of one, if not *the* largest, *state*-managed environmental restoration program in the country and its evolution from a project-to-project process to an ecosystem modeling approach. If and how the citizen participation process has improved to support the large, ecosystem-impacting projects is framed in social justice terms. Similar to the green dot example, the risk to rural residents of the project's fisheries impact results in the authors arguing for the importance of creating a planning process that offers an important role to citizen participation and that trusts its importance and contribution to the success of proposed policies and restoration projects.

Part III includes two very different chapters about the issues involved in moving coastal residents inland. Chapter 6 by Nathan Jessee recounts the resettlement process to date of an indigenous tribe that partnered with the state of Louisiana to seek funding for such after two earlier efforts at resettlement failed. The process and challenges to a successful resettlement are presented, and the parallels to earlier treatment of indigenous Americans are described. Resettlement has been romanticized in American culture, while implementation contains parallel structural violence consistent with past experiences of indigenous peoples.

Chapter 7 by Kristina Peterson examines a topic to date rarely found in the social science literature: The dynamics of the relations of climate displaced populations with the receiving communities and their existing challenges. Differences in cultural backgrounds, race and social class are considered as challenges to overcome but may also be seen as opportunities with a firm commitment to make them be so. Peterson proposes approaches that could address these differences and ways migration could be framed to achieve a positive acceptance by the receiving communities including the focus of culture, food, and religion as unifying elements of the "blending" cultures rather than barriers. She also examines issues of identifying environmentally healthy high ground to avoid the repeat victimization that occurred to Katrina migrants during the 2016 floods that hit central Louisiana and flooded them again in their new locales and encouraging receiving community residents and the in-migrants to work together for an improved inland community.

Part IV is organized to include research on adaptation challenges that confront communities of varying sizes, types, and geographic framings, including work on urban, suburban, rural, and watershed communities.

Chapter 8 by Anna Livia Brand and Vern Baxter and Chap. 9 by Andreanecia Morris and Lucas Diaz consider the extreme challenges of achieving *urban* exceptional recovery in the context of economies that understate risks to lower income residents. They examine the way the government and the economy frame recovery

in a neoliberal political economy paradigm. The authors demonstrate how social and environmental injustice were manifest in a racialized recovery of New Orleans that stands as an extension of pre-Katrina forces and decisions. They recommend ways to return to citizen participation and expanded citizen influence in the recovery process as ways to deracialize it. Chapter 9 provides a case study of the efforts of a housing coalition to modify the “regime” of decision-making and implementation of adequate affordable housing after Katrina by negotiating a compromise of vested interests. Affordable housing, in crisis mode 14 years after Hurricane Katrina, is seen as a key element to a more resilient and disaster-adaptive populous.

Chapter 10 by Michelle Meyer, Brant Mitchell, Shannon Van Zandt, and Stuart Nolan considers how a climate change-affected extreme weather event presents different requirements for an adaptive recovery. First, the speed of the disaster – multiple inches of rainfall in a short period of time – requires the development of different response assistance as pre-event evacuation is not possible because there is no known severe event predicted early enough to initiate evacuation. This new need is described. Second, the impact is discussed of how a storm with such a deluge of flooded areas outside of the floodplain contributes even more to housing shortages post-event for renters who compete with flood victims in search of rentals, if only as a temporary habitation during rebuilding.

While the population in Louisiana is predominantly urban, coastal rural areas have been subject to frequent destructive storms, while significant inland areas joined this challenge after the 2016 floods. Research on Katrina was severely criticized for its focus on New Orleans to the detriment of learning more about the *exceptional recovery* challenges rural areas experienced. Chapter 11 by Alessandra Jerolleman focuses on the theories of rural extreme weather risk and response with the spring 2016 flood as the case analyzed. Limited resources, distance from the state’s power brokers, and possibly being asked to serve as receiver communities while under rural stresses are clearly evident in rural extreme weather challenges.

Design and planning principles explored through a resilience thinking lens can inform a science-based but socially grounded program to increase adaptive capacity, but they are not without their challenges. Chapter 12 by Traci Birch and Jeff Carney offers a review and synthesis of adopted community planning principles and processes that suggest disparate planning frameworks, and agencies are addressing physical and social environmental needs, but a more holistic approach to adaptation is needed.

1.5 Subnational Adaptation Management: What Each Level of Government Might Best Contribute to the Exceptional Recovery Process and Essential Resilience Outcome?

The theme of this book – a state’s experiences and responses to extreme weather including that which is climate change-induced – will likely be a theme studied over and over again as more states move into the trajectory of such challenges. California

is certainly a state that has a near-term robust history of extreme weather/climate experiences and their responses to them like Louisiana, a recent comparison made by Hayden and Cochran (2019). Others could also be mentioned – Texas, Florida, North Carolina, Virginia, New Jersey, and New York.

Undertaking a book about a state also gives me the opportunity to explore if/how more emphasis on state and local adaptation response/control rather than federal would be more effective. I asked specialists their opinion about the question. One replied: “The role of states in hazard mitigation planning was a hot topic up until about a decade ago, but there has been a real drop off.”⁹ Yet while the interest in the state role has waned, Berke’s research itself showed that “federal policies do not make a difference in local land use actions, but state policy exerts a strong influence” (Berke et al. 2014). The increases in climate-induced extreme weather suggest that new research on the combinations and leadership emphases of the government levels are highly warranted. Reinforcing the critical nature of adaptation efforts, former Regional Administrator for the US Department of Housing and Urban Development (HUD) in New York and New Jersey during the region’s recovery from Sandy, Irene, and Lee, Holly Leicht, stated: “. . . it is a huge financial and administrative challenge for cities and states to prepare for the ever-widening range of threats the future may hold” (Leicht 2017, p. 2). Note the emphasis on subnational despite her holding a federal agency administrative position.

While the chapter authors were not asked to consider specifically whether/if subnational adaptation would be more successful, they were asked to consider social justice issues about their topics. I ask the reader to consider whether what you learn from the chapter authors may contribute to your assessment of the role of subnational adaptation, including the benefits or not for social justice in extreme weather response. For example, Scott Hemmerling and his co-authors consider the social justice challenges of the state-level coastal restoration plan. That it is at the state level does not seem to have helped the program commit and implement social justice processes and outcomes systematically from the beginning as they have committed say for diversion sediment physical engineering modeling. One might have assumed because the state coastal restoration efforts are closer to the residents and to the communities, that might have been the case. Continuing the thinking, would a federally run coastal restoration program have done any better? Do we as a society know how to fully engage citizens and communities in the critical decision-making process related to climate change extreme weather response that honors residents and communities fully? It is an imperative that we learn how to do so: “Just recovery requires the full harnessing of communities’ transformative and adaptive capacity, honoring their definitions of resilience, in order to reduce risks for the future” (Jerolleman 2019, p. 99).

⁹Personal communication with Philip Berke, Director, Institute for Sustainable Communities, Texas A & M University, March 11, 2019

1.5.1 Qualities of the Government Levels That Challenge/ Benefit Adaptation

How can the interaction of these three concepts – essential resilience, exceptional recovery, and level of government – be framed for future research on the topic? What has to be considered for each level and the interaction among them to be considered to answer this question? This section will reinforce the need to consider the qualities and challenges of each level of government when deciding whether the federal or the subnational level is best to lead the adaptation. Examples of pros and cons of emphasizing the various levels of government for successful climate change adaptation are offered in Table 1.2. It is not the goal of this introductory chapter to immerse the reader in the details of each of these positive or negative qualities. Rather it is the intent to demonstrate the complexity of the answer to the question: Which level? And, to add to that complexity, the question of which levels serves the most adaptations or the most important adaptations? Or the recovery trajectory, the exceptional recovery, or the utilization of the achieved essential resilience? *MUCH* more research is absolutely necessary.

1.5.2 Avoiding Harm While Improving Federal/State/Local Adaptation Configurations

With this deeper exploration of improving extreme weather adaption by reconfiguring the role of the levels of government comes a serious conundrum, and it is flagged by the recommendation I am making to continue to link adaptation with recovery – a *federally* overseen and funded effort – while I am asking you to think about how emphasizing state and local actions might generate more productive climate adaptation than federal. Adaptation innovations must be conceived and implementations attempted and evaluated at different levels of government *while* the current government level in charge of recovery and mitigation is utilized to respond to current disasters and develop improved adaptations. And, there is no time to delay working on both adaptations – within the current federal system *and* adaptations managed by the lower levels of government.

An example of the challenge framed in this conundrum can be seen in the extreme difficulties which the community and the state of Louisiana are having in trying to achieve just resettlement of the Isle de Jean Charles Biloxi-Chitimacha-Choctaw Tribe (Jessee, Chap. 6, this book). The funding came from the innovative Rockefeller/ HUD CDBG-DR NDRC discussed in several chapters of this book. Thus, the funds are *federal funds governed by CDBG requirements*. While the plan that was awarded the \$48 million proposes that the Tribe (local) be in charge of the implementation and follow the designs the Tribe created with design/experienced construction implementers, some indigenous, chosen by them, the state has modified that plan to conform to the CDBG implementation process. The Tribe is not in charge; the

Table 1.2 Pros and cons of different levels of government taking dominant role in climate change adaptation

	Pros	Cons
Federal	<p>Knows what practices work for mitigation/adaptation and can give guidance (Leicht 2017)</p> <p>Can hone adaptation standards with nationwide data input and then enforcement</p> <p>Currently where most of the taxes are collected for the country and thus the funding is located (Bullock 2016)</p> <p>Encourages adaptation actions when there is insufficient local support for some such as required elevation for residential structures</p>	<p>Some states/communities may feel that federal requirements are meddling in local and state efforts (Leicht 2017). Freeboard elevation requirements are an example One size fits all – but does it?</p> <p>Mitigation (adaptation) outcomes less flexible and thus may be less useful for specific locales</p> <p>Beginning to be overwhelmed by disaster events and costs and thus threatening to limit recovery funds (FEMA 2018a; Becker 2019)</p> <p>Extremely slow pace of providing recovery response and showing no sign of improving the pace turn locals against federal role in exceptional recovery (Laska et al. 2018)</p> <p>Inadequacy of the federal disaster response staff (GAO 2018; Montjoy et al. 2010). No expectation that federal adaptation management by them would be better</p> <p>Heavy imbalance between recovery efforts for homeowners versus renters/landlords (Hersher and Benincasa 2019). Why expect otherwise for adaptation? Extreme social justice challenges</p> <p>Funding only the most secure protection measures that are appropriate for all flood hazards has been at the expense of explaining and encouraging “less perfect,” but much less expensive, efforts that can be effective for shallow, slow moving flood and drainage problems (Wetmore 2019)</p>
State	<p>Can easily seek best practices from peers (states) with similar risks (Leicht 2017)</p> <p>Place-based realities and appropriate approaches more evident (Leicht 2017)</p> <p>Sharing adaptation ideas among its constituent communities more proximate, within some similar conditions, more personal sharing experience (State of Louisiana 2018)</p> <p>State is responsible for land-use regulations which will be even more important with adaptation</p>	<p>Possible infrequency of events occurring reduces capacity to use the opportunities for adaptation due to loss of methods in bureaucratic memory loss. Unfortunately, with the prediction of increased climate change disasters expected, this concern may wain</p> <p>Resistance to adaptation due to perceived additional costs of building construction by developers such as resistance by the Louisiana Codes Council to require extra elevation when building residential structures (Smith and Booher 2017)</p> <p>Limited state planning regulations nationwide to address hazard mitigation that would be supportive of climate change adaptation (American Planning Association 2018)</p>

(continued)

Table 1.2 (continued)

	Pros	Cons
Local	<p>Public/private partnerships may be more doable at local level (Leicht 2017)</p> <p>Better place-based approaches are achievable (Leicht 2017). In the context of “agency,” residents can feel and further develop the connection between their knowledge, engagement, and resilience adaptation outcomes to their community’s risks (Laska 1986, 1990)</p> <p>Experiencing the climate change-induced extreme weather event with all of its specific extreme and unusual qualities provides a direct link between experience and impetus to adaptive action, overcoming psychological resistance (Meyer and Kunreuther 2017)</p> <p>Achieving adaptation successes or even failures that induce adaptation revisions builds resident capacity and feelings of agency (Laska 1986, 1990)</p>	<p>Neoliberal capitalism encourages benefitting the redevelopment class not necessarily to the benefit of the community, especially poor and racial, ethnic, and Native American minorities (Brand and Baxter, Jessee, both this book)</p> <p>Before citizen capacity to participate is grown, the citizens may not be able to have full participation in the decision-making, and thus they can be harmed (Lamb, this book)</p> <p>Disparate financial resources among communities may put some at extreme risk even though residents invest in considering adaptation, rural communities, for example (Jerolleman, this book)</p>
Across levels		<p>Multiple administrative layers – at all the different levels of government – hamper efficient, effective, and timely use of disaster recovery funds (Sloan and Fowler 2015). They may hinder climate change adaptation even more due to noninstitutionalized nature of new activities</p> <p>At both federal and state levels, better resourced states and communities and more politically powerful ones – usually co-occurring – likely will achieve most adaptation opportunities</p>

Note: Appreciation to Alessandra Jerolleman for contributing to refining this list. (Personal communication, May 9, 2019)

implementation process and outcomes are not what the tribe intended (Jessee, again, Chap. 6, this book). Brunner and Nordgren (2016) suggest that past adaptation successes succeeded in making incremental adaptation progress when and where they could adapt their resources to the *circumstances in a community*.

Has this been done adequately with the Tribe? Despite the federal regulations, could it have been done better, like Brunner and Nordgren (2016) propose? Adapt the adaptation resources to the *circumstances in a community* as much as is currently legally possible; and challenge the federal government to adjust their rules and regulations as climate adaptation opportunities emerge in configurations different from the actions current federal programs and rules prescribe. Could climate change innovation have been successfully implemented within the bureaucratic constraints?

Merely coining it a *resilience innovation* was totally inadequate to facilitate an innovation. This example stands as a clear example of the challenges that the country, the states, and the communities are/will have transferring from the earlier recovery model to an adaptation one that is community- and state-based.

The Tribe’s cultural and interpersonal existence is being put at extreme risk because the innovation they proposed to reduce their physical and cultural risks from extreme weather, and for which the \$48 million was awarded, does not fit the current federal rules and procedures and goals of the state – that being a generic model for resettlement or any CDBG program’s implementation. The Tribal members and leadership are caught “dangling” between what they proposed to do – resettle from the physical coastal risk in a manner that would encourage tribal and lifeway survival – *and* what the federal and state governments are prepared to do, which are actually currently being carried out.

Extremely important, this conundrum was not recognized by the Tribe before the competition was implemented by a foundation and a federal agency; to this author’s knowledge, it was not even considered adequately and without public communication of the challenge by those who put the competition together and implemented it. Innovation can seriously harm when it is not thoroughly thought through as much as possible *before* the innovation is attempted to be implemented. Careful study of climate adaptation innovation while it is being developed and during its initial/early implementation is an absolute requirement for just, equitable implementation of it. This holds for whichever level of government is the lead as well as the partners at the other levels. The Tribe’s innovative plan which got the proposal selected, the \$48 million awarded, was caught in a government system that could not handle the innovation.

The tension between innovation and government rules and regulations threatens the most vulnerable more because it is they who need the adaptation the most and the earliest. It is very, very likely that the Tribe will decline in maintaining its cultural practices and tribal interpersonal dynamics that they had before participating in the stressful Rockefeller/NDRRC innovation application and ensuing project that has not addressed the vision and the goals the Tribe articulated in their application. We cannot accept this risk to them as the price *they* pay for the society not approaching the Tribe’s climate change adaptation very, very carefully. Perhaps the likelihood of increased risk and harm to the most vulnerable should have excluded them from even seeking their resettlement through the competition? No more powerful a conundrum than that.

1.5.3 Speed of Recognizing Importance of Subnational Climate Change Response

When the project of creating this case study book first began, the editor believed that the subnational response to extreme weather was not being adequately considered for climate change-induced extreme weather response rather than just for “normal”

disaster recovery. I asked myself: Was there developing a statewide response? Were those responding seeing the differences between previous extreme weather events and what is occurring in the present? What challenges to adaptation were being experienced in specific Louisiana regions and community types of the state? What climate change adaptation efforts were being “birthed”? And their success? It was believed that from such a realistic case combining pre-climate change response with climate change response, recommendations would emerge for the utility or not of subnational adaptation to climate change as it becomes a more powerful driver of extreme weather. The chapter authors contributed their research on specific topics related to this: human-natural system interface, resident engagement requirements, and social justice considerations for those most vulnerable, moving of residents out of coastal risk, and resilience considerations with new climate change risk.

What was not anticipated was how rapidly the recognition of the role of the subnational response was being recognized within Louisiana and also being recognized around the nation. As discussed in Sect. 1.3.1 of this chapter, eight Louisiana adaptation programs were “birthed” during the preparation of this book. And, very clearly from media reports during the same period, subnational leaders – mayors and governors – are stepping forward to assume leadership of climate change adaptation and mitigation without being required to do so (Hersher 2018; Hirji 2019). Media reports of two such responses that were reported during late 2018 confirm this rapidly growing interest in subnational response.

The first example is the response to the release of the *Fourth National Climate Assessment*, Vol. II in late November 2018. Created by government agencies and citizens, it portended a future fraught with *rapidly increasing* climate/weather risks. The next day a media story reported that newly minted US governors recognized that the response to such a threat must include state-level action. The Associated Press headline read: *Natural Disasters Will Be a Priority for Incoming Governors* (Mulvihill 2018).

Similarly, US mayors and governors challenged President Trump’s administration in their rejecting climate change by not sending an American representative to the UN Framework Convention on Climate Change (UNFCCC) in the fall of 2018. Pittsburgh Mayor Bill Peduto commented:

There are more than federal governments at stake now, and the sub-national level is really where it’s going to get implemented anyway. . . It’s really nice when nations sign documents, but what it really comes down to is *what we do in our own neighborhoods and what we do in our own cities*. (NPR 2018)

It is a critical time to consider how to accomplish the most successful essential adaptation. To that goal it is hoped that this volume about Louisiana and its response to extreme weather at the state and local levels engage other states and their government officials, residents, applied resilience research university and nonprofit researchers and practitioners and college students considering their futures to develop successful, just, equitable adaptations to climate-induced extreme weather, to achieve essential resilience. And the chapter authors and I have the same hope for more successful adaptation to essential resilience for Louisiana, for most of us are natives or “adopted natives” of the state. Finally, in emphasizing the state and local levels of response, we hope to have contributed to the very necessary body of

research about which level of government is poised to best lead these adaptation initiatives most successfully. There is no time to spare in appreciating the answer(s) to this question.

Appendix: Sources of Descriptions of New State and City Adaptation Programs (Numbers Coincide with Numbers on Table 1.1 on Page 9)

1. Coastal Protection and Restoration Authority (CPRA). (2017). Louisiana’s Comprehensive Master Plan for a Sustainable Coast. Baton Rouge, LA: Coastal Protection and Restoration Authority. Retrieved from http://coastal.la.gov/wp-content/uploads/2017/04/2017-Coastal-Master-Plan_Web-Book_CFinal-with-Effective-Date-06092017.pdf
2. Louisiana Department of Administration (LDOA). (2015b). *National Disaster Resilience Competition Phase II Application*. Baton Rouge, LA: Louisiana Department of Administration.
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