INTRODUCTION

Hurricane Katrina and the Future of the Past

It started over the Bahamas. A tropical depression began forming on Tuesday 23 August 2005, and the National Hurricane Center (NHC) assigned it the name Katrina. It took until Thursday 25 August until people along the Gulf Coast of the United States and in New Orleans really started taking notice. Early evacuees began leaving the city on Friday 26 August. The city's mayor, Ray Nagin, addressed the public on TV and declared a state of emergency, calling for a voluntary evacuation on the evening of Saturday 27 August. Consequently, more citizens packed their cars with a few days' worth of clothes and their most important belongings and took to the evacuation routes. Those who had set their minds on staying went about boarding up their houses to protect against the hurricane winds. On the morning of Sunday 28 August Mayor Nagin addressed the public on TV again, this time calling for the extraordinary measure of a mandatory evacuation, after Katrina had intensified to a Category 4 storm overnight. The first feeder bends, the outermost cirrus clouds of a hurricane vortex and harbingers of the system's approach, appeared in the sky over New Orleans on Sunday evening. The winds picked up during the night and roared with increasing intensity. Katrina made landfall as a Category 3 storm in St. Bernard and St. Tammany Parish below the city in the early morning hours of Monday 29 August 2005, after having kept most citizens who stayed behind awake or tossing in an uneasy sleep. At around 8:00 A.M. the first levee breach at the Industrial Canal was recorded and water started flowing into the city. One eyewitness from Tremé who had stayed in the city described this moment: "You've seen white caps, on the lakes, or in the ocean? That's how the water's rushing in. You look down the street there and you see the water coming, and it's just rushing in and stuff is floating in it."[1] Additional levee breaches followed during the morning and noon of 29 August until eventually 85 percent of the city was under various depths of water. The toll was enormous: 1,800 people died as a result of Hurricane Katrina. Those who had remained in New Orleans were evacuated—and displaced—eventually, after trying to survive for five days in a city whose systems had broken down completely due to the hurricane.[2]

Changes in the Air
Hurricanes in New Orleans from 1718 to the Present
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https://www.berghahnbooks.com/title/RohlandChanges

On a cold December day in Germany, four years and a few months after Hurricane Katrina had flooded and almost destroyed New Orleans, I flew to the city in order to interview forty New Orleans citizens (those who stayed as well as those who evacuated) and ten experts (scientists, economists, city planners, and politicians) on their disaster memory of Katrina. The goal was, ultimately, to find out how people remember a disaster and whether they learn from their experience—in short: whether and how memory/knowledge translates into action.[3] My interview guideline covered all aspects of the actual hurricane experience, from preparedness to whether interviewees remembered Hurricane Betsy in 1965—the last big one before Katrina—and whether they thought Katrina was a "natural" or a human-made (social) disaster. However, the question which ultimately inspired this book's extended journey from the recent past of Katrina in 2005 to the comparatively deep past of New Orleans's founding years in 1718 was about the future.

The answers to my question whether interviewees were afraid that a hurricane like Katrina could reoccur can be neatly partitioned into two groups: First were those who feared and thought it possible (or were even certain) that a Katrina-like disaster could repeat itself. Those also agreed that if such a disaster *did* happen again they would not be able to go through the emotional stress again, that this would be the end of the city of New Orleans.

> *I mean, you know, yes, it can happen again. Hopefully there are things being put in place that will protect us more but I know that we're still very vulnerable, that we're still walking a tight rope, somewhat. But it's still our home. I think if it happened again, that would be it. I know, and not just myself, everybody I talk to: 'Could you go through it again?'—'No way.' I don't think we have the physical or emotional energy to go through this again.*[4]

Those in the other group were often categorical in their dismissal of the possibility that such a disaster could reoccur, at least within their lifetime.

> *That's not gonna happen no more. You take out a whole population of people, how many times that's gonna happen? They had to move a million people. That's gonna happen no more. That's why I say it should be recorded. It's a once-in-a-life-time-thing.*[5]

It is almost an anthropological constant that humans draw on the past in order to form an opinion about the future.[6] German historian Reinhard Koselleck conceptualized this phenomenon for historical time under the term "future of the past."[7] He diagnosed a shortening period between the experienced past and the expected future due to the acceleration of events during modernity. Hand in hand with this acceleration went the element of the unknown, which, hence,

meant breaking out of the erstwhile cyclical understanding of history.[8] To interview people affected by Hurricane Katrina about their expectations of the future was therefore an eerie experience of seeing the future of the past in the making—albeit in a still-open time horizon that will hopefully remain unconsumed for a long time to come. Extending the gaze back into the city's hurricane history (see figures 1.1 and 1.2 in chapter 1) gave those very contextual Katrina-statements an uncanny timelessness. Both groups thus drew on their experience, but with different outcomes and possibly different implications for individual, future action. Representatives of the second group in some cases freely admitted that they wanted or had to believe that a Katrina-like event would not reoccur within their lifetime so as to be able to move on in life.[9]

The scientifically informed perspective, however, is on the first group's side and it paints a bleak picture of the future. Richard Campanella, historical geographer and New Orleanian by choice, belonged to my group of experts. He had studied the city geographically and historically for twenty years and stayed during Hurricane Katrina. His answer to my question was that

> it will definitely happen again. Other disasters, like earthquakes or volcanoes, have roughly the same chance of happening tomorrow as yesterday. But what's different about a hurricane striking lower Louisiana is that tomorrow is *riskier* than yesterday. Why? Because the soils are sinking, the coast is eroding, the sea is rising, and all indications are that global temperatures are warming, thus further increasing sea level and likely the frequency or severity of tropical storms. Thus, tomorrow is riskier. Many advocates of New Orleans often say: "Well you know, there are disasters in other cities, too, so why are we saying 'we must evacuate, we must move.'" As someone who loves this city, I too am tempted make that argument. But it's comparing a broken leg to cancer. A broken leg could happen any time and it's bad and you're out of commission but it heals; whereas the cancer—the geological cancer that we have here—might well prove fatal. It will definitely reduce the eventual lifespan of the city. We will not be here a thousand years from now. If we do things properly we might be able to squeeze out a few hundred years.[10]

Campanella's reference to an extended future in the interview and his deep-past perspective in *Bienville's Dilemma* were the first instances that made me think about Katrina in a historically much larger context than just Hurricane Betsy (1965) or the twentieth and twenty-first centuries.[11] With the sentence "if we do things properly, we might be able to squeeze out a few hundred years," Campanella was referring to what he had said about wetland loss in Louisiana and to the problem of sinking soils and the increasing flood risk New Orleans is exposed to in the context of ongoing anthropogenic climate change. In post-Katrina New Orleans, "doing things properly" had, among

many other programs to rebuild the city, taken shape as the Dutch Dialogues, a group of delegates (architects, scientists, policymakers) from New Orleans visiting the Netherlands to see the world-leading flood management systems of the Rhine-Meuse-Scheldt Delta, and, in turn, inviting a Dutch delegation to New Orleans to acquire direct advice on how to develop the city's flood protection in a resilient way.[12]

Doing things properly with regard to sustaining New Orleans under conditions of global warming, then, is what climate change research calls "adaptation to climate change." While climate change on the global scale is described in terms of increasing temperatures due to rising carbon dioxide levels in the atmosphere, the effects of these temperature changes on the local scale may be variegated and certainly not uniform. One aspect that has emerged from climate science over the past decade with near certainty, however, is that climatic extreme events (i.e., tropical cyclones, flood events, hailstorms, droughts, etc.) will become more frequent and/or more intense in a warming climate.[13] While earthquakes and volcanoes are geological phenomena that, to our current knowledge, are not connected with changes in the climate system[14] and do not occur with any apparent regularity or in cycles, tropical cyclones are seasonally occurring climatic phenomena whose fluctuation is connected to larger-scale systems such as El Niño/Southern Oscillation (ENSO), the Atlantic Multidecadal Oscillation (AMO), and the Intertropical Convergence Zone (ITCZ), which are predicted to shift with ongoing anthropogenic climate change.[15] While no single hurricane event can be directly attributed to climate change, tropical climatologists are predicting an increase in activity—if not in number then in the intensity of future hurricanes under warming conditions, because hurricanes are chiefly fueled by warm sea surface temperatures.[16]

Ostensibly, adaptation to present-day and future climate change means reacting to those global and local, long-term and rapid-onset changes in the environment. Encapsulated in this simple understanding of adaptation is, again, how knowledge and experience translate into action. Clearly, in the context of the field of climate change adaptation research, pioneered by the Intergovernmental Panel on Climate Change (IPCC), adaptation is treated as a conscious and target-focused and plannable process on the local, regional and national policy-making level of countries. This seems to be self-evident and taken as a matter of course.[17] Yet, judging from the relatively recent history of global and national climate policy, it is clear that this particular understanding of adaptation is a historically new development.[18]

Looking at the disastrous aftermath of Hurricane Katrina, my focus thus started shifting from disaster memory of one discrete event to adaptation to the hurricane hazard in general. In particular, adaptation *before* anthropogenic global warming had become a globally pressing issue and a major field of research and policy production. How had societies adapted to climatic extreme

events such as hurricanes in the past and before the term even existed? Could the disaster that was Katrina just be the symptom of a much longer history of (non-)adaptation of the city of New Orleans? Was Katrina New Orleans's Three Hundred Year Hurricane, in the same sense as the American anthropologist Anthony Oliver-Smith had diagnosed the 1970 Ancash earthquake as Peru's Five Hundred Year Earthquake in his seminal 1994 study?

Oliver-Smith takes the Peruvian earthquake disaster that caused seventy thousand deaths and destroyed 80 percent of the built infrastructure of the affected Department of Ancash as an opportunity to unravel the area's long-term history of social vulnerability and adaptation to natural hazards. The anthropologist turns to the beginning of the Spanish colonial period, showing how the conquerors disrupted time-tested adaptive practices of the indigenous population by imposing unsustainable Castilian architectural styles, settlement patterns and surplus-extraction oriented food production.[19] Throughout Oliver-Smith's article, the social vulnerability of the Peruvians seems unbroken and continuous across the five-hundred years of his study.

While this book's focus is inspired by Oliver-Smith's long-term perspective, it departs from that model in important ways. On the one hand, adaptation, not vulnerability is at its center—though the two concepts are evidently related. On the other hand, the continuity suggested in Oliver-Smith's Peru-study may be difficult to transfer to New Orleans. Apart from the fact that the socio-environmental conditions in the Mississippi Delta prior to French settlement were very different from those of Spanish-conquest Peru in the early sixteenth century, the city's history is characterized by three distinct political regimes. Louisiana was claimed for France by the French explorer Robert Cavelier de la Salle in 1682, the first forts (Mobile and Biloxi) were set up along the Gulf Coast in 1699 and 1700, and the cornerstones for New Orleans were laid in 1718; in 1762 the colony was ceded to Spain in the Treaty of Fontainebleau, in 1800 Spain handed Louisiana back to France, and in 1803, the Jefferson administration bought it in the Louisiana Purchase. Added to this rather eventful political history is the relatively high (physical) mobility of the non-enslaved parts of colonial societies, enabling them to choose *not* to settle and adapt to the recurring threat of hurricanes on the Gulf Coast but to move to friendlier environments devoid of this hazard. Thus, clearly, when extending the focus on adaptation from Hurricane Katrina in 2005 back to New Orleans's colonial beginnings, the question whether any kind of continuity in adaptation to hurricanes in fact existed, must remain open to scrutiny.

However, is it necessary to go so far back in time to learn about adaptation to the hurricane hazard in New Orleans? Would it not be enough to stick with the time period between, say, Hurricane Betsy in 1965 and Katrina in 2005? In terms of the question how memory/experience transforms into action, the temporal distance between those two hurricane events, forty years—a human

generation—is significant. Disaster researchers have found that the average half-life of disaster memory was about one to one-and-a-half generations. In other words, if natural disasters occur less frequently, risk-awareness and preparedness decrease and a "disaster gap" ensues.[20] In addition, considering that cultural practices and risk-management institutions arose from the experience of disasters over time, it makes sense to go back farther in time in order to form a viable perspective on how societies adapted to the hazard of hurricanes. Implicit in this perspective—as well as in the problem of the disaster gap— is the factor of repetition. Climate historian Franz Mauelshagen has called it a key concept in historical disaster research as "it is the link between the past and future, or, more precisely, between past experience and future societies."[21] Prevention and risk management require forecasts and these usually rely on data of the past, or in other words, on the future of the past.

New Orleans, as so many other North American cities, with its comparatively short but well-recorded history, is an ideal case to study the socio-environmental dynamics of a city and its societies from its inception. Colonial authorities left abundant written evidence of their reasoning for the choice or abandonment of a settlement site, of learning about new environments and environmental hazards. In order to be able to draw conclusions about New Orleans's long-term adaptedness or non-adaptedness to hurricanes, it is therefore important to first establish what the French founding fathers of the city as well as the settlers might have known about hurricanes when settling between the Mississippi and Lake Pontchartrain in 1718. Most fundamentally, were they even aware of the risk of hurricanes to the region? From a present-day perspective, one might easily take for granted that they were, as European colonies in the Caribbean had been battered by hurricanes since Columbus' arrival in 1492 and hurricanes were no novel occurrence at the beginning of the eighteenth century. However, could colonials perceive hurricanes as moving systems that, after touching Cuba or Saint-Domingue, might also make landfall at the Louisiana Gulf Coast? These questions about the beginning of New Orleans's hurricane history concern knowledge as a precondition for adaptation. These aspects need to be clarified before the historical development of specific adaptation options and practices can be considered.

Environmental archaeologist Marcy Rockman suggested that it takes humans who move into unfamiliar environments at least one generation (thirty-five years) to acquire robust knowledge about local climatic patterns, the carrying capacity of a given soil or the flood regime of a river.[22] In other words, adaptation options are embedded in time and, in the case of Louisiana, in a wider local, national, and transatlantic historical context. However, there is no determinism in technological and scientific development with regard to adaptation. As the long-term perspective in this book will show, the availability of adaptation options through the interplay of science and technology does not

guarantee what has been called successful adaptation. Time and again, political priorities and cultural values got in the way of what with hindsight may appear to have been obvious choices.

This book thus explores how New Orleans's societies have adapted to the recurring threat of hurricanes from the French colonial foundation of the city in 1718 across three political regimes, French colonial, Spanish colonial, and American to hurricane Betsy in 1965 and touching on Hurricane Katrina in 2005. While the general geographical focus is on the city and the downriver parishes of St. Bernard, Jefferson, and Plaquemines, the question about the evolution of hurricane knowledge includes the wider geographical and cultural contexts of the Caribbean and the transatlantic republic of letters within which notable phenomena such as hurricanes were discussed. This book considers adaptation to the hurricane hazard in the wider social, cultural, and political context that emerged from the historical record. That is, I understand adaptation as the result of social practices that develop in the aftermath of repeated natural extreme events over time. Yet, hurricane events also affected social practices that had no connection to the hazard whatsoever. Clearly, hurricane adaptation can be and is influenced by decisions, social processes and vulnerabilities which are not directly related to the hazard. In other words, in some of the case studies that follow, the historical context becomes more important than the actual story of the hurricane disaster. This fact points to the enigmatic and complex character of the concept of adaptation and of disasters as the entanglement of "processes and events, social, environmental, cultural, political, economic, physical, technological, transpiring over varying lengths of time."[23]

The insights we may gain on adaptive practices on the individual level and through interview studies is unfortunately not sustainable throughout the whole period of time that is covered by this book as there are no comparable historical sources that span several generations, let alone centuries. In other words, researching adaptive practices in the aftermath of hurricanes over a time period of three hundred years, it was necessary to search for answers on the more macro-level of institutions in order to reach a certain measure of homogeneity in the source material. Records at this level of society not only facilitate a long-term perspective on possible institutional change in the aftermath of hurricane disasters, but also on the effect that general institutional change (unrelated to hurricane impacts) has on the capacity of a society to cope with and adapt to the hurricane hazard. Evidently, and to some extent, inevitably, in an initially colonial setting such as New Orleans with its long history of slavery, this leads to a documentary bias toward a European, white, and predominantly male perspective that is difficult to circumvent other than through the reflexive application of *adaptation as a relative concept* as outlined in chapter 1.

The information on adaptive practices throughout the eighteenth century was derived from documents generated by the local colonial authorities. In

the French case this refers to the correspondence of the governor and/or intendant, the two highest ranking officials in the colony, and to the correspondence of the royal engineers with the Company of the Indies or the minister of the marine, depending on whether the colony was administered by the company (1717–31) or by the French crown (1731–62). The Spanish colonial period is based on the correspondence of the Spanish governor and/or intendant with the minister of the Indies in Seville and on the Spanish city council (the *cabildo*) records for the eighteenth century. The case studies of the nineteenth century are based on the New Orleans Conseil de Ville (City Council) records, which continued to be written in French until the mid-1830s; on newspapers, which, in New Orleans only started to be printed at the beginning of the nineteenth century; and on federal state level records for the nineteenth and twentieth centuries. In those few cases, where English editions of French or Spanish primary sources were available, I have indicated this in the notes; otherwise all translations from French and Spanish records into English are by me.

Studying adaptation to extreme events such as hurricanes historically, and over the long term is an interdisciplinary endeavor that draws on several fields of historical and climatological research. Understanding the physical aspects of the hazard of hurricanes and how they relate to the climate system is key for grasping its complexity which, in turn, is part of the history of hurricane knowledge and science and ultimately for the question of adaptation to this hazard.[24] The long-term natural scientific history of hurricanes, in which the three hundred years of this study is embedded, is covered by paleotempestologists. They reconstruct the frequency and intensity of past tropical cyclones from the archives of nature—that is, from sea floor and lagoon sediments as well as tree rings. This field intersects with paleoclimatology working on long-term data series of ENSO cycles, which are crucial for understanding the (multi-) decadal variation of hurricane frequencies in the Gulf of Mexico. Paleoclimatology is capable of reconstructing ENSO and hurricane events for time periods that exceed the human archives (written historical records) by far, particularly in the Americas.[25] In turn, where human and natural archives overlap, historical records are usually more accurate with regard to dates and, crucially, they contain detailed information about the impacts of extremes on societies.[26]

Its focus on historical hurricanes and their societal repercussions place this book in environmental history, and, more specifically, in disaster history. For the past twenty years, historical disaster studies have developed as a sub-field of environmental history insofar as they have been dealing with natural rather than technological disasters. The majority of studies that have emerged from historical disaster research have concentrated on discrete catastrophic events that acted as caesurae for the affected societies.[27] Thus, researching a long-term perspective that takes into account repeated impacts of natural extreme events

based on historical records is still a new approach for which, so far, there exist only a few instances.[28] A notable example with regard to hurricanes is Stuart Schwartz's recent Sea of Storms, which does for the (Circum-)Caribbean what this book does for New Orleans and the Mississippi Delta region.[29] Considering the wealth of literature that has emerged in the aftermath of hurricane Katrina, and considering the general disaster-proneness of New Orleans it is surprising that only two articles with a specific focus on disasters (in general) and one on the hurricanes of the city's French colonial period have been published so far.[30] While not focusing on disasters exclusively, Christopher Morris's and Richard Campanella's excellent long-term environmental histories of the Lower Mississippi Valley and the Mississippi Delta, provide a wealth of geological, environmental and socio-cultural information on which this study draws throughout.[31]

The narrative of this book is structured along five adaptive practices and one effect (political vulnerability) of a practice wholly unconnected to hurricanes and adaptation, namely, slavery. The five practices—*levee building, evacuation, disaster migration, disaster relief,* and *insurance*—appear at different points in time in the historical record and require shifting narrative strategies. That is, although most of the book is structured chronologically, some chapters look at developments over the long term, while others concentrate on specific hurricane events. I intermittently draw on the city's full hurricane chronology (see figures 1.1 and 1.2) in order to show parallels or to highlight differences in coping and adaptation between events.

In the following, chapter 1 starts by briefly inquiring into the present-day understanding of adaptation as outlined by the IPCC. This institution's definition has acquired somewhat of a benchmark status and hence merits a closer look. Based on a critical reading and reappraisal of the IPCC's definition from a historical perspective I argue for understanding adaptation as a relative concept. With this slightly altered lens with which to track adaptive practices through time, we first return to knowledge as a precondition for adaptation. The chapter thus shifts focus between our twenty-first-century knowledge of hurricanes and the state of hurricane knowledge at the time of Louisiana's first settlements in 1699 and 1700 and of the foundation of New Orleans in 1718. By zooming in on seventeenth- and early-eighteenth-century tracts on hurricanes in the French and British Caribbean, a clearer picture emerges of how eighteenth-century contemporaries understood hurricanes (*ouragans* in French). With this tableau of Caribbean hurricane knowledge context we are hence able to assess the reactions to New Orleans's first hurricane experience in 1722, four years after the foundation of the city. Based on this first glance into the history of hurricane knowledge, the remainder of chapter 1 is dedicated to outlining how hurricanes can be chased safely through historical archival material.

Chapter 2 follows Louisiana's founding fathers, the Canadian brothers Jean-Baptiste Le Moyne de Bienville and Pierre Le Moyne d'Iberville, in their early

exploration of the Mississippi Delta and their later quest, starting in 1718, for a site to build New Orleans in order to establish their state of knowledge about the hazard-proneness of the area. Their correspondence with the metropole, together with the letters of the royal engineers who came to oversee the building of Louisiana's capital, shed light on the question of environmental learning, the role of indigenous knowledge, and the early technological adaptation of the French to the Mississippi environment.

Levee building is chronologically one of the first adaptive practices that appears in the historical records. The fact that the French imported their own levee-building technology with all its virtues and flaws from France to the Mississippi Delta is highly significant for the question of adaptation, as we will see by following this practice through the French and Spanish dominion of Louisiana and to the Great Mississippi Flood of 1927. In and around New Orleans levee building protected both life as well as property from river floods and hurricane storm surge that was pushed upriver and temporarily reversed the Mississippi's current. Yet the plans to build levees in front of New Orleans were driven by the much more frequent experience of river floods. Therefore, the first part of chapter 2 focuses more strongly on technological adaptation in New Orleans and the plantations that were located up and down river from the city. The second part zooms in on La Balize (the beacon), a strategic military and trading post set up at the mouths of the Mississippi in 1723. Here, chapter 2 returns to the question of environmental learning, showing how difficult it was not only for the French, but also for the Spanish, to interpret the Mississippi Delta environment properly, to judge its inherent long-term risks, and on how technology was thought to solve the obstacles they encountered. In chapter 2 we hence travel through all three of New Orleans's political phases: French, Spanish, and American.

The intimate connection of the adaptive practices of *evacuation* and *disaster migration* with environmental knowledge emerges as the undercurrent of chapter 3. Both practices prevent harm to human life but are different in scope. Evacuation is usually a short-term measure to remove people temporarily from harm's way and is either externally or self-administrated.[32] Disaster migration, on the other hand, is when people move from a disaster-prone environment to a different, ideally less-disaster-prone place of settlement without returning. If this process is administered top-down, it can turn into forced migration, or displacement. The focus of this chapter is on voluntary—that is, self-administered—disaster migration. In chapter 3 the geographical focus shifts again between the Caribbean and the Louisiana Gulf Coast, as well as between the two practices. In early-eighteenth-century New Orleans disaster migration occurred frequently in the aftermath of hurricanes, which were usually followed by prolonged periods of food scarcity and a consequent price inflation. The loss of frustrated settlers who decided to move to less-disaster-prone places upriver from New Orleans jeopardized the economic prosperity of the colony

throughout its French and Spanish periods. Economic anxieties due to population loss in the aftermath of a hurricane reappear even in chapter 5, at the end of the nineteenth century, though, of course in a politically different context. Evacuation follows its own historical chronology that includes multiple factors such as the geographical vulnerability of New Orleans to hurricanes, population growth, the evolution of meteorology as a scientific field, and the development of several unrelated technologies. The second half of chapter 3 will hence shed light on those crucial moments in time during the 1870s and, again, during the 1940s when it became possible to forecast hurricanes and to warn at-risk populations in the Caribbean and on the Louisiana Gulf Coast, thus enabling the securing of life and property in these areas on a new scale.

In chapter 4 New Orleans's enslaved population and slavery as a systemic factor of political vulnerability in a natural hazard situation come into focus. That is, chapter 4 explores in more detail one of the instances in which aspects that are unconnected with hurricanes and adaptation become magnified by the extreme event and suddenly take center stage. While slavery had been part of New Orleans's and thus French and Spanish Louisiana's fabric from the start, the colony turned into a fully fledged slave society later than any of its Caribbean counterparts. This transition occurred precisely around the time of the geographically close-by Haitian Revolution and the Louisiana Purchase in 1804 and 1803, respectively. The explosive situation with regard to the growing population of enslaved Africans in and around New Orleans, the social tensions among whites and free people of color in Louisiana's process of acquiring statehood, as well as the War of 1812 form the backdrop—or rather, the foreground—of the hurricane of 1812. On the night of 19 August 1812 the uproar of the natural elements was apparently used by New Orleans slaves to coincide with an attempt at overturning the social order, through a revolt in the city. By centering on political vulnerability in connection with war and revolution, chapter 4 stands in the wider context of subjects such as national security and state(s) of emergency.[33] Both of these subjects have received scholarly attention from historians, though usually not with a strong focus on natural hazards and disasters.[34]

Chapter 5, then, returns to adaptive practices but to one that is less directly linked to technological and scientific developments than chapters 2 and 3. Rather, it is connected to factors such as population growth and economic development. From the point of view of governance, *disaster relief* as an adaptive practice to relieve social hardship in the aftermath of a disaster becomes a more pressing issue because increasing numbers of people could potentially fall into poverty as a result of property loss and loss of livelihood through a disaster. In 1893, in the middle of a U.S.-wide economic depression, the devastating Cheniere Caminada Hurricane hit the barrier islands Grand Isle and Cheniere Caminada below New Orleans. Two thousand people were killed in the states of Louisiana and Mississippi, some seven hundred (half of the pop-

ulation) on Cheniere Caminada alone. Thus, chapter 5 follows the hurricane's aftermath and the emergence and centralization of a local hurricane disaster relief institution in New Orleans, the Citizens' Central Storm Relief Committee. At the same time, Louisiana representatives introduced a bill to the House of Representatives asking for federal disaster relief from the hurricane that had hit their state. This interplay of the local, state, and federal levels in the provision of disaster relief comes into view in chapter 5. Here we oscillate between the sphere of adaptive practices on the local institutional level on the one hand, and a more systemic view that includes political culture and decision-making on the federal level on the other.

This local–federal shift in perspective continues in chapter 6, which focuses on *insurance* as an adaptive practice and brings us to Hurricane Betsy in 1965, also known as Billion Dollar Betsy. It was the last hurricane to flood New Orleans (i.e., the Lower Ninth Ward and Gentilly) in a major way before Hurricane Katrina hit the city forty years later. We start again from a local perspective on the impact of the hurricane on New Orleans. A set of letters to President Lyndon B. Johnson provides insight on the social effects of the existing, unequal system of federal disaster relief. The fact that this system had reached its financial limits by the mid-1960s was recognized and discussed by politicians in Washington, DC, at the time. By focusing on the attempt to transition from the overdrawn disaster relief provisions to a disaster insurance program, chapter 6 sheds light on a pivotal point of systemic change with regard to hurricane (and flood) adaptation in the aftermath of Hurricane Betsy. Throughout the chapter, our gaze shifts from New Orleans to the level of federal politics and to the discussion about the form that this new program was to acquire.

The influence of natural hazard insurance on individual as well as national adaptive capacity is often subtle and hidden. It seems that, precisely because of this hidden nature of insurance, the political process of negotiation between the different governmental agencies has so far largely remained in the dark.[35] Yet the question as to the specific structure of an insurance program (i.e., whether it is mandatory or voluntary, and whether it is a purely private industry program or a public–private partnership, etc.) is crucial with regard to the program's functionality, and ultimately, for people's adaptation and vulnerability on the ground. While all of these factors seem to belong to the rational realm of economic and political decision-making, chapter 6 shows how the deeply ingrained legal and political traditions together with ideas of American identity influenced the process that led to the implementation of the National Flood Insurance Program (NFIP) in 1968.

In conclusion, chapter 7 pulls the different strings of this book together and attempts to distill more general points from the overview over the *longue durée* of hurricane adaptation in New Orleans.

Notes

1. As I agreed with the interviewees, they will remain anonymous. Interviewee No. 12, male African American from Treme, New Orleans, age 57, on 18 December 2009.
2. See Richard Campanella's chapter on Hurricane Katrina in Richard Campanella, Bienville's Dilemma: A Historical Geography of New Orleans (Lafayette: Center for Louisiana Studies, University of Louisiana at Lafayette, 2008), 329–39.
3. The interview study was conducted in the context of the program "Climate and Culture" within the research group "Memory of Disasters" at the Institute for Advanced Study in the Humanities Essen (KWI). Nonexpert interviewees were chosen primarily with regard to whether they had stayed (13) or evacuated (27) during Hurricane Katrina. An even count between African American (19) and white (21) interviewees was attempted and almost reached. The age of interviewees ranged from twenty-three to eighty-seven, and the social stratification ranged from transient worker to taxi driver, social worker, business owner, musician, church rector, graduate student, professor, and attorney. The interviews were qualitative, biographical interviews that started with an open entry question and that then followed an interview guideline. Statistical data (i.e., age, income, profession etc.) were collected with a questionnaire. For a more detailed description of the interview method—that we called the "enviro-biographical interview"—and more Katrina-interview excerpts see Eleonora Rohland et al., "Woven Together: Attachment to Place in the Aftermath of Disaster: Perspectives from Four Continents," in Listening on the Edge, ed. Stephen Sloan and Mark Cave (New York: Oxford University Press, 2014).
4. Interviewee No. 7, female, white New Orleanian from Lakeview, age 55, on December 11, 2009.
5. Interviewee No. 19, male African American New Orleanian, age 56, on 8 January 2010.
6. One of the most important reference works from the field of neurobiology is still David H. Ingvar, "'Memory of the Future': An Essay on the Temporal Organization of Conscious Awareness," Human Neurobiology 4, no. 3 (1985).
7. For the English version of the book see Reinhart Koselleck, *Futures Past: On the Semantics of Historical Time,* Studies in Contemporary German Social Thought (Cambridge, MA: MIT Press, 1985).
8. Reinhart Koselleck, Vergangene Zukunft. Zur Semantik geschichtlicher Zeiten (Frankfurt am Main: Suhrkamp, 1989), 33–34.
9. E.g., interviewee No. 3, female white New Orleanina from Lakeview, 73 years old, December 8, 2009.
10. Richard Campanella, Tulane University, New Orleans, expert interview on December 10, 2009.
11. Campanella, *Dilemma.*
12. U.S. Green Building Council, "Dutch Dialogues: New Orleans architects look to the Netherlands for ideas on living with water," http://plus.usgbc.org/dutch-dialogues/ accessed 17 March 2017.
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19. Anthony Oliver-Smith, "Peru's Five Hundred Year Earthquake: Vulnerability in Historical Context," in *Disasters, Development and Environment,* ed. Ann Varley (Chichester, UK: John Wiley & Sons, 1994), 34–40. A further important influence for the scope of this book was Greg Bankoff, *Cultures of Disaster: Society and Natural Hazard in the Philippines* (London: Routledge Curzon, 2003).
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21. Franz Mauelshagen, "Disaster and Political Culture in Germany since 1500," in Mauch and Pfister, *Natural Disasters,* 44.
22. Marcy Rockman, "New World with a New Sky: Climatic Variability, Environmental Expectations, and the Historical Period Colonization of Eastern North Carolina," *Historical Archaeology* 44 (2010), 4–5; Marcy Rockman, "Knowledge and Learning in the Archaeology of Colonization," in *Colonization of Unfamiliar Landscapes: The Archaeology of Adaptation,* ed. Marcy Rockman and James Steele (New York: Routledge, 2003), 15.
23. Anthony Oliver-Smith, "Global Changes and the Definition of Disaster," in *What Is a Disaster: Perspectives on the Question,* ed. Enrico L. Quarantelli (London: Routledge, 1998), 178.

24. Kerry Emanuel, *Divine Wind: The History and Science of Hurricanes* (Oxford: Oxford University Press, 2005).
25. Jeffrey P. Donnelly et al., "Climate forcing of unprecedented intense-hurricane activity in the last 2000 years," *Earth's Future* 3, no. 2 (2015); Michael E. Mann et al., "Atlantic Hurricanes and Climate over the Past 1500 Years," *Nature* 460, no. August 13 (2009).
26. For a research summary of the field of climate impact research see Franz Mauelshagen, *Klimageschichte der Neuzeit 1500—1900,* Geschichte kompakt (Darmstadt, Germany: WBG, 2010), 19–20.
27. Caesurae have been marked by societal learning processes, in particular. See Christian Pfister, "Learning from Nature-Induced Disasters. Theoretical Considerations and Case Studies from Western Europe," in Mauch and Pfister, *Natural Disasters.*
28. For studies from historians see Mauelshagen, "Disaster," Bankoff, *Cultures,* and Raymundo Padilla Lozoya and Myriam de la Parra Arellano, " Metodología, métodos, técnicas. Sistematización de la recurrencia de amenazas naturales y desastres en el estado de Colima, México," *Estudios sobre las Culturas Contemporáneas* 21, no. 3 (2015). For an anthropological perspective see Oliver-Smith, "Earthquake"; for studies by historical geographers see Georgina H. Endfield and Isabel Fernández Tejedo, "Decades of Drought, Years of Hunger: Archival Investigations of Multiple Year Droughts in Late Colonial Chihuahua," *Climatic Change* 75, no. 4 (2006); Karl W. Butzer and Georgina H. Endfield, "Critical perspectives on historical collapse," *Proceedings of the National Academy of Sciences* 109, no. 10 (2012); Matthew J. Hannaford and David J. Nash, "Climate, history, society over the last millennium in southeast Africa," *Wiley Interdisciplinary Reviews: Climate Change* (2016); George Adamson, "Institutional and community adaptation from the archives: A study of drought in western India, 1790–1860," *Geoforum* 55 (2014); James L. Wescoat, "Water, Climate, and the Limits of Human Wisdom: Historical-Geographic Analogies Between Early Mughal and Modern South Asia," *Professional Geographer* 66, no. 3 (2014).
29. Stuart B. Schwartz, *Sea of Storms: A History of Hurricanes in the Greater Caribbean from Columbus to Katrina* (Princeton, NJ: Princeton University Press, 2015).
30. Richard Campanella, "Disaster and Response in an Experiment Called New Orleans, 1700s–2000s," *Oxford Research Encyclopedias: Natural Hazard Science* (2016); J. Donald Hughes, "New Orleans: An Environmental History of Disaster," in *Natural Resources, Sustainability and Humanity: A Comprehensive View,* ed. Angela Mendonca, Ana Cunha, and Ranjan Chakrabarti (Dordrecht, Netherlands: Springer, 2012); Paulette Guilbert Martin, "Les Ouragans de Louisiane de 1717 à 1750 et Leurs Effets sur la Vie des Colons," *Revue de Louisiane/Louisiana Review* 4, no. 2 (1975).
31. Christopher Morris, *The Big Muddy: An Environmental History of the Mississippi and its Peoples, from Hernando de Soto to Hurricane Katrina* (Oxford: Oxford University Press, 2012); Campanella, *Dilemma.*
32. The term "disaster migration" gained prominence in the aftermath of Hurricane Katrina in 2005. Anthropologist Anthony Oliver-Smith used it in in his article "Disasters and Forced Migration," cf. Anthony Oliver-Smith, "Disasters and Forced Migration in the 21st Century," *Understanding Katrina: Perspectives from the Social Sciences* [website] (2006), http://understandingkatrina.ssrc.org/Oliver-Smith/.
33. For the United States, William O. Walker III noted that many scholarly works dealing with national security and foreign relations from a historical point of view tended to

concentrate on World War II exclusively. Walker challenges this scholarship by taking the history of national security back to the very formation of the United States. William O. Walker, *National Security and Core Values in American History* (New York: Cambridge University Press, 2009), xi. For foundational texts on states of emergency see Jacques Derrida, "Force of Law: The Mystical Foundation of Authority," in *Deconstruction and the Possibility of Justice,* ed. Cornell Drucilla, Michael Rosenfeld, and David Gray Carlson (New York: Routledge, 1992); Michel Foucault, "Governmentality," in *The Foucault Effect: Studies in Governmentality,* ed. Graham Burchell, Colin Gordon, and Peter Miller (Chicago: Univeristy of Chicago Press, 1991); Giorgio Agamben, *State of Exception* (Chicago: University of Chicago Press, 2005).

34. Existing studies have focused on the role of Roman emperors in recreating order in the aftermath of disasters; "good government" in medieval Italian city republics and German imperial cities after the occurrence of flood disasters; the role of the bubonic plague in early modern European state building, and in a wider sense also the formation of a "secure society" in relation to fire disasters and insurance in the early modern German territories. Cf. Martin Dinges, "Pest und Staat," in *Neue Wege in der Seuchengeschichte,* ed. Martin Dinges and Thomas Schlich (Stuttgart, Germany: Steiner, 1995); Mischa Meier, "Roman Emperors and 'Natural Disasters' in the First Century A.D.," in *Historical Disasters in Context: Science, Religion, and Politics,* ed. Andrea Janku, Gerrit Jasper Schenk, and Franz Mauelshagen (New York: Routledge, 2012); Gerrit Jasper Schenk, "Managing Natural Hazards: Environment, Society, and Politics in Tuscany and the Upper Rhine Valley in the Renaissance (ca. 1270–1570)," in Janku, Schenk, and Mauelshagen, *Historical Disasters in Context*; Cornel Zwierlein, *Der gezähmte Prometheus. Feuer und Sicherheit zwischen Früher Neuzeit und Moderne* (Göttingen, Germany: Vandenhöck und Ruprecht, 2011).
35. The German environmental historian Uwe Lübken is one of the few historians who has worked extensively on the history of the National Flood Insurance Program (NFIP), see Uwe Lübken, "Die Natur der Gefahr. Zur Geschichte der Überschwemmungsversicherung in Deutschland und den USA," *Behemoth: A Journal on Civilisation* 1, no. 3. Special Issue: Surviving Catastrophes (Anne Dölemeyer, Hg.) (2008); Uwe Lübken, *Die Natur der Gefahr.* Überschwemmungen *am Ohio River im neunzehnten und zwanzigsten Jahrhundert* (Göttingen, Germany: Vandenhoeck & Ruprecht, 2014), 278–91. There is a chapter on the NFIP in Robert Hinshaw's biography of Gilbert F. White, which focuses on White's role in the evolution of the program. Robert E. Hinshaw, *Living with Nature's Extremes: The Life of Gilbert Fowler White* (Boulder, CO: Johnson Books, 2006), 153–70. See also Craig Colten's chapter on the development of flood insurance and the NFIP. Craig E. Colten, *Southern Waters: The Limits to Abundance* (Baton Rouge: Louisiana State University Press, 2014), chap. 3.