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The Forgotten Coast

Although not the strongest of storms in terms of wind speed or central pressure during the busy 2005 Atlantic hurricane season, Hurricane Katrina became the most devastating and costliest hurricane in United States history given its size and landfall location. Katrina subjected the coastal populations of Louisiana and Mississippi to an unprecedented combination of natural forces and human failures.[1] Early morning on August 29, 2005, Hurricane Katrina made its final landfall in Mississippi as a Category 3 storm with sustained winds of 125 mph and a storm surge of up to 30 feet.[2] A lack of power, no drinking water, dwindling food supplies, understaffed law enforcement, and delayed search and rescue efforts were widespread. While considerable national media attention focused (almost exclusively) on the city of New Orleans, the destruction in Mississippi alone would qualify among the costliest natural disaster in U.S. history. This perceived inattention has led some to proclaim Mississippi the "invisible coast."[3]

Picking up the pieces and starting over are grueling tasks. Recovering from disasters is a social and physical process involving the restoration of communities and the natural environment. Recovery does not happen quickly; nor is it easy. Hard decisions must be made by residents, businesses, local officials, and government agencies at all levels as to who and what should be made whole again and when and where those actions and activities should begin. These decisions are fraught with difficult and unpopular choices, often pitting one group's interest against another's (Chapter 5).

[1] S. L. Cutter, 2005, "The Geography of Social Vulnerability: Race, Class, and Catastrophe," in Social Science Research Council, *Understanding Katrina: Perspectives from the Social Sciences*, http://understandingkatrina.ssrc.org/Cutter/.

[2] Hurricane Katrina actually had three landfalls: the first on August 25 as a Category 1 storm between Hallandale Beach and North Miami Beach, Florida; the second as a Category 4 storm in southeast Louisiana at Grande Isle on the morning of August 29; and the final landfall later in the morning on August 29 as a Category 3 storm near Pearlington, Mississippi, and Slidell, Louisiana. See http://www.ncdc.noaa.gov/special-reports/katrina.html#met; R. D. Knabb., J. R. Rhome, and D. P. Brown, 2005, "Tropical Cyclone Report, Hurricane Katrina, 23–30 August 2005," National Hurricane Center. http://www.nhc.noaa.gov/pdf/TCR-AL122005_Katrina.pdf (accessed February 7, 2013).

[3] See M. Savidge, who refers to it as the invisible coast: "Mississippi Quietly Recovers from Katrina," http://www.msnbc.msn.com/id/10994793/ (accessed February 7, 2013), while we prefer to name it the forgotten coast.

Should recovery efforts first begin with infrastructure and the economy (getting the jobs back), or should the first task be repairing private homes, even those in high-risk areas like right along the beach? Should local officials maintain the status quo and allow rebuilding in high-hazard areas such as floodplains, or should land use and zoning laws be changed to prevent rebuilding in the same dangerous places? These decisions are often contentious in normal times, but with the immediacy of the disaster, such decisions are made quickly with little thought given to the future repercussions of these actions. "If only we had a chance to do this over" is a refrain you sometimes hear in communities who rushed to replace *what was* rather than taking a slower path to reconstruction and build *what should be* for the community to recover in a sustainable way and enhance resilience to the next event.

When Hurricane Katrina struck the Mississippi coast in August 2005, it was not the first time that the region experienced major devastation; nor will it be the last. While major media attention was drawn to the plight of residents in New Orleans and their suffering from the effects of the levee failures and subsequent flooding, caused in part by Katrina, the impact on residents along the Mississippi coast was covered far less, virtually unnoticed by the major media. Hurricane Katrina was a watershed event in U.S. history because of the severity of its impact on a major metropolitan region – New Orleans. Katrina also was the costliest disaster in U.S. history, estimated at $125 billion, and it claimed more than eighteen hundred lives.[4] Long after media attention waned and moved onto the next disaster, the region is still recovering. The struggle, almost a decade after the hurricane, is a reflection of significant physical, economic, and psychosocial burdens. These include rising insurance costs, unemployment, Federal Emergency Management Agency (FEMA) bureaucracy, inconsistent permitting and rebuilding processes, Katrina fatigue, and the multiple shocks such as the British Petroleum (BP) oil spill and other hurricanes that set back recovery. The long road home continues with periods of moving forward, and periods of stagnation or moving backward.[5] The human face of the region has changed and along with it the rich diversity that once characterized the culture, spirit, and historic sense of place along the Gulf Coast (Box 1.1). The landscape is dotted with clusters of rebuilt homes, but also abandoned neighborhoods where the only remnants are concrete slabs or pilings, barely visible because of overgrown vegetation.

[4] Estimates vary on the number of deaths and the economic losses depending on what is counted. However, most reports put the death toll around 1,800 and economic damages (including direct damages and business interruption losses) ranging from $108 to $125 billion (see MunichRe, *Severe Weather in North America: Perils, Risks, Insurance* [Munich, Germany: Münchener Rückversicherungs-Gesellschaft, 2012]). For conservative estimates on death and damages see E. S. Blake, C. W. Landsea, and E. J. Gibney, 2011, "The Deadliest, Costliest, and Most Intense United States Tropical Cyclones from 1851 to 2010 (and Other Frequently Requested Hurricane Facts)," NOAA Technical Memorandum NWS NHC-6, Miami: National Weather Service/National Hurricane Center. http://www.nhc.noaa.gov/pdf/new-nhc-6.pdf (accessed February 7, 2013).

[5] S. L. Cutter, C. T. Emrich, J. T. Mitchell, B. J. Boruff, M. Gall, M. C. Schmidtlein, C. G. Burton, and G. Melton, 2006, The Long Road Home: Race, Class, and Recovery from Hurricane Katrina, *Environment: Science and Policy for Sustainable Development* 48(2):8–20.

Box 1.1 Biloxi's Little Saigon

Biloxi has a thriving Vietnamese immigrant population just like other American cities. Whether engaged in shrimping, working in the casinos, or employed in the shipbuilding industries, the Vietnamese are a close-knit group. The social ties binding the intergenerational immigrants together were embedded in the physical neighborhood – the place of Little Saigon. Located along Oak Street in East Biloxi, Little Saigon is the symbolic center for Vietnamese residents all along the Mississippi coast. Populated with shops, restaurants, and multiple generations living under the same roof, Little Saigon was the hub of cultural and religious identity for the Vietnamese residents. Then it was all gone – wiped out by the 20-foot storm surge from Katrina.

Rebuilding the physical structures was challenging, but those hardships were nowhere near as difficult as fleeing from Vietnam and resettling in the United States – a cultural and linguistic challenge. The resilience of the Vietnamese populations to hurricanes has been well documented, especially the experiences of the Vietnamese community in New Orleans.[6] In the aftermath of Katrina, there is a scattering of the community of Little Saigon. The encroachment of speculators and casinos into the neighborhood real estate market, buying up available properties, meant that many former residents were now priced out of the neighborhood either as owners or as renters. Because of the shortage of housing and lacking a stable income, many of the Vietnamese Americans were housed in FEMA trailers outside the neighborhood, further displacing them from their symbolic community. More than a quarter of the younger generation sought work elsewhere, leaving their ties to community behind, further reducing the identity of the local community. But they rebuilt their homes and boats, often one and the same. Then the BP oil spill occurred. The ecological disaster decimated the livelihoods of many of the Vietnamese shrimpers, hoping for a better life than what they left behind in Vietnam.

We use Hurricane Katrina and its impact on Mississippi's Gulf Coast first to identify and then to explain those factors that influence the timing and location of recovery in the region, but more importantly, the potential inequalities in the process and its outcomes. The empirical documentation of the recovery process and its differential outcomes across space and over time is a key contribution of the work as well as the systematic development and description of recovery trajectories and the driving forces behind them. The research combines a number of innovative approaches for understanding disaster recovery. These include baseline geographic data on social,

[6] K. J. Leong, C. A. Airries, W. Li, A. C-C Chen, and V. M. Keith, 2007, Resilient History and the Rebuilding of a Community: The Vietnamese American Community in New Orleans East, *J. American History* 94:770–779; C. A. Airriess, W. Li, K. J. Leong, A. C-C. Chen, and V. M. Keith, 2008, Church-Based Social Capital, Networks, and Geographical Scale: Katrina Evacuation, Relocation, and Recovery in a New Orleans Vietnamese Community, *Geoforum* 39(3):1333–1346; Y. Park, J. Miller, B. C. Van, 2010, "Everything Has Changed": Narratives of the Vietnamese American Community in Post-Katrina Mississippi, *Journal of Sociology & Social Welfare* 37(3):79–105.

built-environment, and hazard vulnerabilities; a historical narrative on past conditions that influence the contemporary settlement landscape; a statistical analysis of historical rates of settlement and demographic change in the region; and forecasts for the future trajectory of settlement and demographic change as well as its geographic footprint. We also document the role of inequalities in shaping the recovery process through interviews with key individuals in selected case study communities. In this way, the research furthers our understanding of not only the pace and space of recovery from a geographic perspective, but also the role of inequalities and those antecedent conditions that give rise to a "recovery divide." What it means to have "recovered," however, is far from clear. Having a repaired home is one measure, but that may preclude consistent employment, the reconstruction of schools, the availability of child care, relief from mental stress, or the company of neighbors – a sense of community. Accordingly, this chapter begins by untangling the meaning of recovery, exploring its many manifestations.

Measuring some aspects of recovery is easier than quantifying others in terms of available data and the length of time since the event. For example, an ecosystem may take years to regain its preimpact status or fully recover from an adverse event. Knowing what to measure and for how long to see trends in recovery could be costly in terms of time and resources. Indeed getting the science right to make claims of full recovery, for example, is compounded by the identification of appropriate variables to measure and a host of exogenous factors that add complexity rather than clarity to our understanding. Conversely, recovery in the cultural landscape – the imprint of humans on the natural world or in the built environment – is visible in the short term and a number of measures or surrogates are obtainable with little monetary expense.

It is this last area, "seeing" change in the built environment, that is the basis for our understanding of differential recovery along the Mississippi coast. To identify temporal and spatial inequities in recovery, we employ fieldwork – collecting photographic and other evidence – to document the pace of recovery as it varies from place to place. Other unique data sets, such as repeat field observations and building permit applications, and technologies, such as geographic information systems and spatiotemporal statistical analyses, are employed to identify and monitor differences in the human landscape.

We also seek explanations for the differences: Were some places more affected by the physical impact than others? What mitigation measures were/were not utilized? What social structures exist/are most effective for long-term recovery? Does a diversified economic base matter? Some of these questions are not answerable in a purely quantitative fashion and demand careful qualitative analysis of social systems and structures. Others do lend themselves to empirical work. While we strive toward answering more than just questions about the way things are, we also respond to normative questions – our attempts to show how things ought to be.

The Nature of Recovery

Recovery is the process of restoring, rebuilding, and reshaping physical infrastructure, social and economic systems, and the natural environment, ultimately returning to a stable state following a disaster.[7] Recovery from disaster is both a social process with specific short- and longer-term outcomes and a physical process of replacing the damaged built environment (or reconstructing it) and restoring the natural environment to some acceptable level. Oftentimes repopulation and housing reconstruction are used as proxy indicators of recovery outcomes, as are economic growth and jobs (Chapter 4).[8] However, these measures fail by themselves to address other important aspects of community recovery such as rebuilding social networks and social capital, or securing help for groups marginalized in recovery such as renters and the homeless.[9] Recovery can be measured at the household, neighborhood, city, or regional scale, but what does it mean to have "recovered"? As recovery is a long and continuous process, questions of recovery for whom, recovery of what, and recovery to what end inevitably arise. For example, in 2010 Mississippi Governor Haley Barbour declared that the recovery in his state was nearly complete: restoring to what was there before, but "not simply rebuilding, but we are building back bigger and better than ever."[10] However, many residents, still without permanent homes and adequate livelihoods, may be skeptical of this proclamation (Chapter 5).

Recovery is about the social choices that communities make, and these choices manifest themselves in the landscape. The differential impact of a hazard event is a combination of the magnitude or intensity of the hazard event and exposure – the number of people and structures (including infrastructure) at risk or in harm's way (Chapter 3). The differential impact works in tandem with the underlying *social vulnerabilities* of communities to influence the rate and extent of recovery (see Chapter 6). For example, communities with few institutional and financial resources may experience lengthier recovery periods compared to more affluent communities.[11]

[7] The definition is paraphrased (p. 237) from G. P. Smith and D. Wenger, 2007, Sustainable Disaster Recovery: Operationalizing an Existing Agenda, in H. Rodriquez, E. L. Quarantelli, and R. R. Dynes (eds.), *Handbook of Disaster Research* (New York: Springer), pp. 234–257.

[8] E. A. Sayre and D. Butler, 2011, "The Geography of Recovery: An Analysis of the Mississippi Gulf Coast after Hurricane Katrina," Southeast Region Research Initiative, http://www.serri.org/publications/Documents/USM%20Project%2080040%20-%20The%20Geography%20of%20Recovery%20-%2018%20July%202011%20(Butler%20and%20Sayer).pdf (accessed February 7, 2013); C. Burton, J. T. Mitchell, and S. L. Cutter, 2011, Evaluating Post-Katrina Recovery in Mississippi Using Repeat Photography, *Disasters* 35(3):488–509; A. Curtis, D. Duval-Diop, and J. Novak, 2010, Identifying Spatial Patterns of Recovery and Abandonment in the Post-Katrina Holy Cross Neighborhood of New Orleans, *Cartography and Geographic Information Science* 37(1):45–56; C. Finch, C. T. Emrich, and S. L. Cutter, 2010, Disaster Disparities and Differential Recovery in New Orleans, *Population and Environment* 31(4):179–202.

[9] M. C. Comerio, *Disaster Hits Home: New Policy for Urban Housing Recovery* (Berkeley, CA: University of California Press, 1998); B. D. Phillips, *Disaster Recovery* (Boca Raton, FL: CRC Press, 2009).

[10] Mississippi Office of the Governor, 2010, "Five Years after Katrina: Progress Report on Recovery, Rebuilding, and Renewal," Jackson, MS: Office of Governor Haley Barbour, http://www.governorbarbour.com/news/2010/aug/Katrina5years.pdf (accessed February 7, 2013). Quote is from page 2.

[11] D. Alexander, *Confronting Catastrophe: New Perspectives on Natural Disasters* (New York: Oxford University Press, 2000).

The magnitude of the event influences recovery, but it is not always true that greater magnitude events have longer recovery times; it depends on when and where such events occur (the exposure). Chapter 8 provides a number of case studies illustrating this principle. Similarly, there is ample social science evidence that gender, race, and class differences significantly influence disaster recovery patterns.[12] Lastly, reconstruction nominally takes more land as businesses and homeowners often use the opportunity to build back with more square footage than before, displacing lower-income residents.[13]

Is the Past a Prologue to the Future?

A number of models exist for understanding how communities recover from disasters and these are explored in more detail in Chapter 8. In general, most assume some form of a linear progression with a primary focus on the reconstruction of the built environment during the various phases of recovery: the immediate emergency period, restoration of basic services and functions, and reconstruction.[14] What is less apparent is how the processes of recovery affect different communities within the city. For example, four months after the hurricane struck the New Orleans metropolitan area, Jefferson Parish (the suburb) had 100 percent of its public schools opened, while Orleans Parish (central city) had only 5 percent open and a year after the storm the percentage of open public schools had increased to only 29 percent.[15] While a variety of neighborhoods and communities equally shared the physical impacts of this storm, their social, cultural, and economic composition differ considerably, and this in turn creates differences in recovery. Measuring all the components of recovery is a challenge, but there are some approaches that examine specific trends (such as population growth, economic vitality, or housing) that can be used as surrogates for comparing preevent with postimpact patterns for different places (Chapter 4).

Postdisaster social and economic trends are generally consistent with predisaster tendencies, although the disaster itself may overburden those economic sectors already

[12] E. Enarson, 2012, *Women Confronting Natural Disaster: From Vulnerability to Resilience* (Boulder, CO: Lynne Rienner); B. D. Phillips, D. S. K. Thomas, A. Fothergill, and L. Blinn-Pike, *Social Vulnerability to Disasters* (Boca Raton, FL: CRC Press, 2010); W. Peacock, B. H. Morrow, H. Gladwin (eds., *Hurricane Andrew: Ethnicity, Gender, and the Sociology of Disasters* (London: Routledge, 1997); C. W. Hartman and G. D. Squires, (eds, *There Is No Such Thing as a Natural Disaster* (New York: Routledge, 2006).

[13] J. E. Haas, R. W. Kates, and M. J. Bowden, (eds.), *Reconstruction Following Disaster* (Cambridge, MA: MIT Press, 1977).

[14] R. W. Kates and D. Pijawka, 1977, From Rubble to Monument: The Pace of Reconstruction, in J. E. Haas, R. W. Kates, and M. J. Bowden (eds.), *Reconstruction Following Disaster* (Cambridge, MA: MIT Press), pp. 1–23; C. B. Rubin, 2009, Long Term Recovery from Disasters – the Neglected Component of Emergency Management, *Journal of Homeland Security and Emergency Management* 6(1): article 46.

[15] A. Liu, M. Fellowes, and M. Mabanta, 2006, "Special Edition of the Katrina Index: A One-Year Review of Key Indicators of Recovery in Post-Storm New Orleans," Brookings Institution, Metropolitan Policy Program, http://www.brookings.edu/~/media/research/files/reports/2006/8/metropolitanpolicy%20liu/20060822_katrina.pdf. (accessed February 7, 2013).

in decline or speed up social transformations already under way.[16] These trends can be described as continuous and characterized by gradual linear changes, and when punctuated by a catastrophic event (such as a major disaster), they may exhibit no discernible change in the direction of the patterns (as represented in Figure 1.1). If a community was declining in population or economic power, however, the disaster would not effectively alter that trajectory, and the community would continue to decline although there may be a short period of growth in the immediate aftermath. For example, in the 1995 Kobe earthquake, there was a short economic boost assisted by reconstruction activities, but when those efforts were completed, the economy returned to its preimpact level of decline.[17] The opposite is also true. If a community was increasing in economic capital, a disaster could temporarily depress that growth, but it would quickly rebound to its predisaster upward trending levels, in essence making people better off after the disaster than they were before.[18] The trajectory is often influenced by larger contextual changes that have local implications, such as a large infusion of external aid or the spillover effects from rapidly developing areas close by. In the case of the 2008 Sichuan earthquake, the Chinese government committed billions of dollars to rebuild the region, not only providing a stimulus to the regional economy but increasing the national economic growth by 0.3 percent.[19]

Regional transformation can also occur on a time line that is irregular, with periods of stagnation alternating with growth or decline. In some cases small or large events punctuate the time line periodically, altering its course and producing a stair step rather than a smooth curve (Figure 1.2). After the catastrophic event, the trajectory can change in a number of different ways. It can become continuous or remain punctuated and either increase or decrease until some type of equilibrium is reached.

Mississippi's trajectory has been a combination of the two curves – smooth at times during its history, punctuated at others. Population trends, for example, have been accelerated at times, producing a steeper curve, and dampened at other times, resulting in a flatter curve or slower growth and development. Even with a series of defining events or tipping points[20] in the nineteenth century, such as the Civil War and the 1878 yellow fever outbreak, and in the twentieth century, with the two world

[16] There is some evidence to suggest this; see F. L. Bates and W. G. Peacock, *Living Conditions, Disasters, and Development: An Approach to Cross-Cultural Comparisons* (Athens, GA: University of Georgia Press, 1993). However, there is little empirical support for a consistent pattern in the trajectories of recovery after disasters.

[17] S. E. Chang, 2010, Urban Disaster Recovery: A Measurement Framework and Its Application to the 1995 Kobe Earthquake, *Disasters* 34(2):303–327.

[18] D. Bennett, 2008, Do Natural Disasters Stimulate Economic Growth? *New York Times*, July 8, 2008, http://www.nytimes.com/2008/07/08/business/worldbusiness/08iht-disasters.4.14335899.html?pagewanted=all&_r=0 (accessed February 7, 2013).

[19] Ibid.

[20] "Tipping point" is a phrase that refers to a time when a parameter reaches a threshold (or when a singular event) and abruptly changes or alters some system. In social systems, the term is used to define a point in time when social groups or social processes quickly and dramatically change or when a small nonlinear change makes a big difference. See M. Gladwell, *The Tipping Point: How Little Things Can Make a Big Difference* (Boston, MA: Little, Brown, 2000).

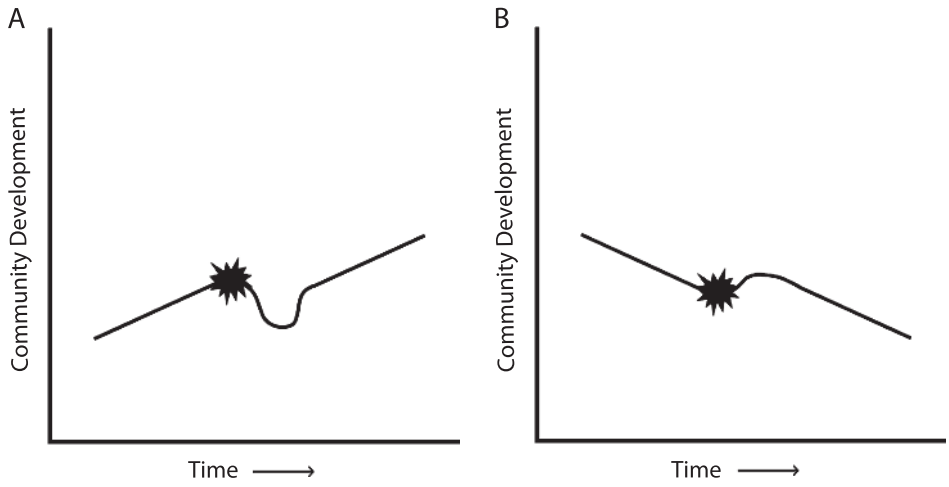

Figure 1.1 Continuous change in community development patterns over time. Continuous change (increasing or decreasing) is interrupted by disaster with postevent initial decline but subsequent growth (A). The initial downward spiral is temporarily offset with some short-term growth, but then the predisaster decline continues afterward (B).

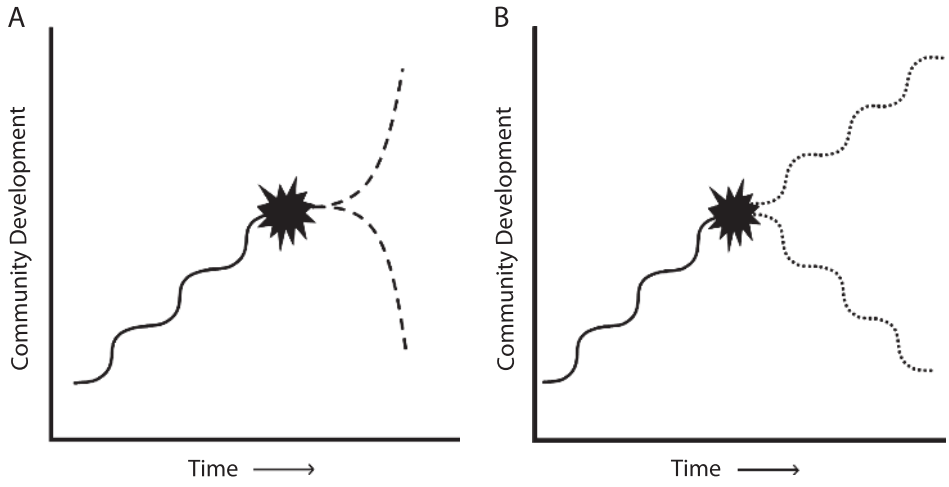

Figure 1.2 A punctuated trajectory of community development. A combination of large and small events alters the course of development or population growth at irregular intervals. When a disaster occurs, the punctuated trajectory can change to either a smooth or a continuous trend, either increasing or decreasing (A). It can also retain its stair-step characteristic post event and either increase or decrease (B).

wars (see Chapter 2), the trajectory generally remained positive. However, during the turbulent 1960s and especially after Hurricane Camille, expected population and economic growth waned. It is during the 1960–2005 period that the smooth curve of development becomes punctuated. Employment became more cyclical to the boom

and bust of extractive industries, responsive to national forces of recession, causing growth rates to slow, but importantly not to decline. It was during this period as well that social tensions between the races, embodied in the civil rights movement, culminated in the Civil Rights Act in 1964. Such milestones are reflected in the development history where the direction and shape of the trajectory curves changed (Chapter 7).

For coastal Mississippi, the recovery trajectory shows the stair step curve, with tipping point events that have slowed and, in some instances, reversed the pre-Katrina trends. One tipping point includes the national mortgage and debt crisis, which effectively halted housing reconstruction along the coast because of stiffened lending requirements. Subsequent shocks during the recovery, such as the BP oil spill, and yet another hurricane (Hurricane Isaac in 2012) set back recovery for the region as a whole. However, it is the implementation of changes in the flood insurance requirements that may ultimately point to reversals in trajectories of recovery, especially at the local scale.

Setting the Geographic Stage

John Hancock may have had the largest signature on the Declaration of Independence, but his namesake county is the smallest of coastal Mississippi (see Figure 1.3). The Pearl River forms its western extent; it is a heavy mix of swamp, cypress, and rocket engines. Stennis Space Center serves as a major employment anchor here. The built-up east includes Bay St. Louis, Waveland, and Diamondhead.

The county was organized in 1812 and its county seat, Bay St. Louis, has been an important center of power since the beginning. The first act of the Mississippi legislature upon the state's admission to the United States in 1817 was to incorporate that city as the state capital. This designation lasted but a few hours when a reopened debate and vote crowned Natchez instead. Portions of the coast have been used for resource extraction, as a resort, and, more recently, for gambling.

William Henry Harrison's presidency lasted only thirty-two days. Perhaps giving his term a bit more permanence, he is one of two presidents – Andrew Jackson being the other – to lend his name to a coastal Mississippi county. Created in 1841 from western Jackson and eastern Hancock, the county is one of just thirty-four in the country with more than one county seat, a distinction shared by Gulfport and Biloxi. Whereas Gulfport came to prominence around the turn of the last century with the construction of a modern port facility, Biloxi served as a port and transshipment point for the French, British, and Spanish from the city's founding in 1699.

Prestorm visitors marveled at the strip of white sand on one side of U.S. 90 and a row of antebellum homes on the other. Beauvoir, the home of the Confederacy's first and only president, is among this group and presently preserved by the Sons of Confederate Veterans. An active port, Gulfport, punctuates the coast's middle section. Slightly inland, small low-intensity manufacturing such as vacuum cleaner assembly

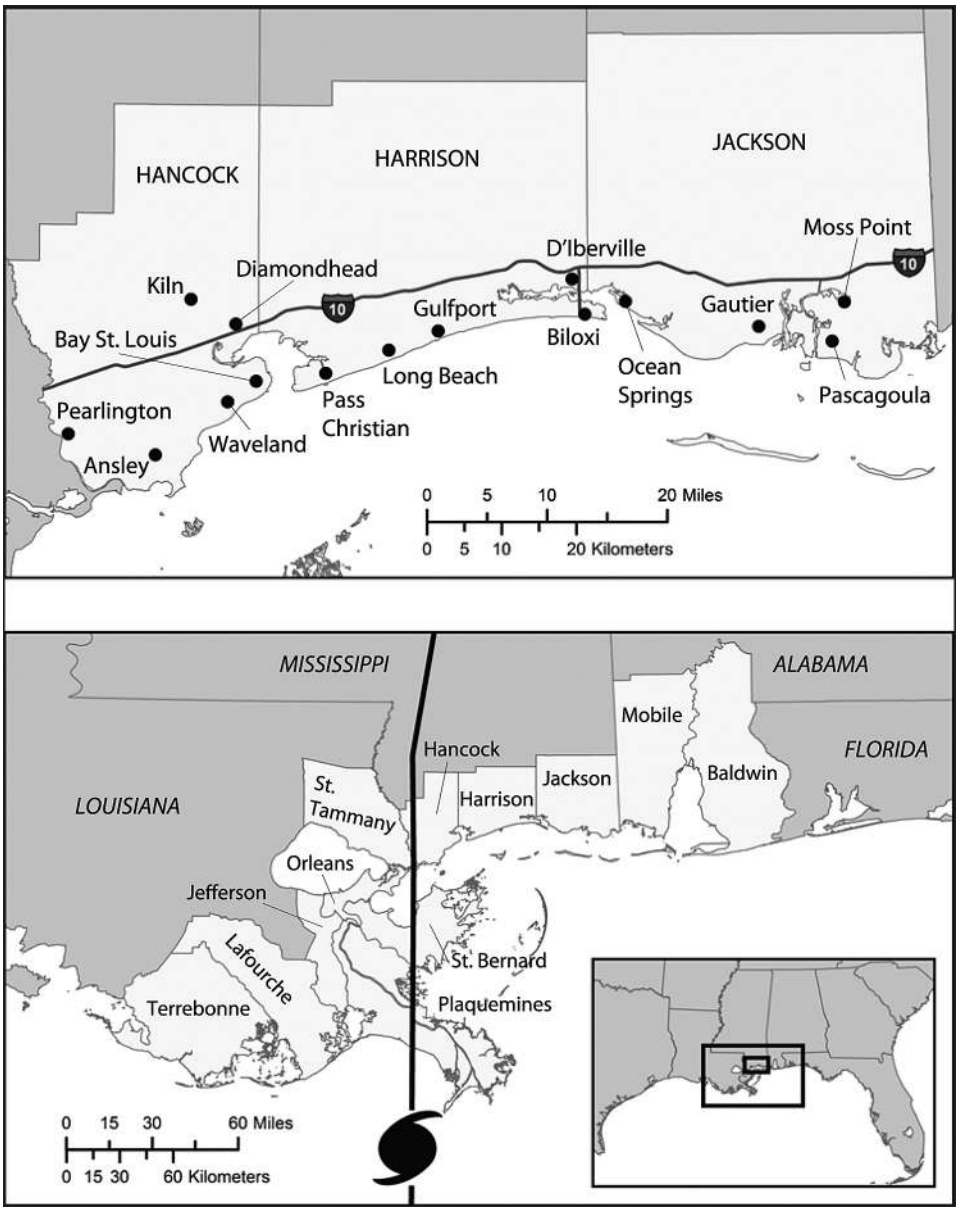

Figure 1.3 Study area map. Counties affected by Hurricane Katrina from storm surge and flooding (bottom) with a detailed overview of the Mississippi coast and its communities (top).

at the Oreck plant in Long Beach provided some employment; Oreck has since left, citing insurance difficulties and the lack of skilled labor.

Gambling has a long history on the coast, as we show later in subsequent chapters. Gaming was common at hotels that catered to steamboat and railroad travelers in the