

# Chapter 5

## Adapting to a Smaller Coast: Restoration, Protection, and Social Justice in Coastal Louisiana



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### 5.1 Introduction

Louisiana's coastal zone (Fig. 5.1) is a naturally dynamic area that has undergone many changes over the past 8000 years coinciding with the shifting deltaic lobes of the Mississippi River (see Fig. 2.2 in Boesch). Recent decades, however, have seen a rapid acceleration of rates of land loss and transitions of habitat types resulting from increasing sea level rise and land subsidence, saltwater intrusion, reduced sediment flow, increasing eutrophication, large storm events, and habitat clearing and alteration due to infrastructure development along the coast (Carruthers et al. 2017). Over this same time period, coastal residents have become increasingly and disproportionately dependent on the coastal zone for living space and recreation, ports and harbors, oil and gas production, commercial and recreational fisheries, marine construction, ship and boat manufacturing, tourism and recreation, and marine transportation (Hemmerling et al. 2016; Weinstein et al. 2007). Most of these economic activities are based on local renewable and nonrenewable natural resources and are therefore largely immovable and highly sensitive to natural and human-induced changes, including fluctuating global economic conditions, environmental stress, climate change impacts, coastal habitat destruction, and increasing social and economic pressures. Shoreline erosion and coastal land loss also threaten the onshore infrastructure that supports these activities, including the

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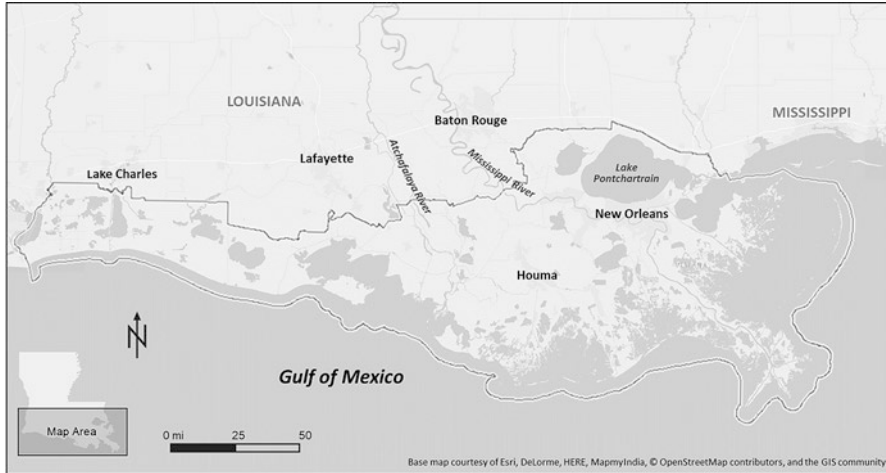
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**Fig. 5.1** Map of southern Louisiana showing major cities and the coastal zone. Base map courtesy of Esri, DeLorme, HERE, MapmyIndia, © OpenStreetMap contributors and the GIS community. (Data retrieved from Louisiana Department of Natural Resources)

extensive network of oil and gas infrastructure and pipelines that cross the coastal zone (Hemmerling et al. 2016).

The extent of societal dependency on these activities in the face of increased levels of environmental, economic, and social vulnerability has made managing coastal resources for the public good more challenging than at any time in the past (Weinstein et al. 2007). Recent decades have seen a number of shifts in coastal management priorities: from local problem-solution approaches to broader ecological restoration strategies and, most recently, to large-scale, unified restoration plans that are no longer constrained by political boundaries, embracing multiple jurisdictions and watershed-ocean gradients (Reed 2009). Each of these regimes has a strong science or engineering foundation and seeks to produce predetermined ecological outcomes (Colten 2017) and ultimately results in a shifting of the distribution of the benefits of protection and restoration to greater spatial and temporal scales. In the case of Louisiana's Coastal Master Plan, a science-driven restoration plan that relies heavily on numerical models to optimize project selection and location, the benefits of restoration and protection are anticipated to be widely distributed among a larger, but more abstract, coastal population. Further, numerical model results are able to examine the expected distribution of benefits to future populations.

State policy makers acknowledge that the restoration and protection benefits derived from the numerical model results are spatially variable, owing to both funding and biogeophysical constraints. In some locations of the coast, even with full implementation of the Master Plan, land area is expected to greatly diminish, while in others the land area will be largely maintained. Further, planners acknowledge that implementation of structural protection projects may not be feasible for some

coastal communities and areas outside the major levee systems. In some cases, residents of these areas will require nonstructural protection, while in others the adverse future environmental conditions may ultimately displace people, infrastructure, and possibly even the entire communities. With these consequences in mind, coastal planning in Louisiana raises several issues of social justice, many of which arise from the techniques and practices state coastal policy makers use to select restoration and protection projects. The main concern is the extent to which the voices and values of residents bearing the greatest burden of coastal restoration are integrated into planning practices.

This chapter traces the history of coastal planning and the social justice implications of the shift from piecemeal to comprehensive, coastwide planning. It tackles these questions through a close examination of several key topics. First, it traces the emergence and evolution of coastal planning processes, focusing on the shift toward science-driven, numerical models and how and to what extent public engagement contributed to planning processes and the development of conceptual frameworks. Next, the chapter examines three different aspects of social justice – distributive, procedural, and contextual – asking how each might or might not be impacted by the activities of coastal restoration planning in Louisiana. Finally, the chapter ends with a close examination of recent efforts by state policy makers to enhance public participation for the development of the 2017 Coastal Master Plan and analyzes to what extent new techniques for public engagement potentially translate into more socially just selections for future coastal proposals geographically, socially, and economically.

## **5.2 Historical Evolution of Coastal Restoration Planning in Louisiana**

To more fully understand the costs and benefits of coastal restoration and how these are distributed among coastal residents, it is important to understand the historical development of restoration policies and the restoration planning process itself. The coastal protection and restoration planning process has continuously evolved over several decades as local, state, and federal agencies developed a number of plans and policy proposals to combat the persistent loss of land that has affected Louisiana's coastline since at least the 1930s. The most expansive plan developed thus far has been the 2017 update to the state's 50-year Coastal Master Plan. Unanimously approved by the Louisiana Coastal Protection and Restoration Authority (CPRA) in April 2017, this plan significantly expanded upon the original 2007 Master Plan as well as the 2012 update. As part of the plan, state officials proposed 124 projects that would maintain or build approximately 800 square miles of land and could save as much as \$150 billion in flood damages over the next 50 years. The CPRA estimates that the state would lose another 2250 square miles of land by 2067 if not able to fully implement the Master Plan in the coming decades,

resulting in over \$12 billion in annual flood damages (Schleifstein 2017). The state acknowledges that, even if fully implemented, the Coastal Master Plan will be unable to protect the entire coast of Louisiana and that the combination of land loss, sea level rise, and subsidence will continue to take a toll on Louisiana's coastal communities for decades to come. Just as the impacts of the state's coastal crisis will be more pronounced in some communities than in others, the degree of protection afforded by the Coastal Master Plan will not be evenly distributed across the coast. The planning process itself will necessarily result in the establishment of winners and losers in coastal protection and restoration, raising the possibility of social and environmental injustices and outcomes.

### ***5.2.1 Pre-Katrina: From Piecemeal Projects to Broad-Scale Ecological Planning***

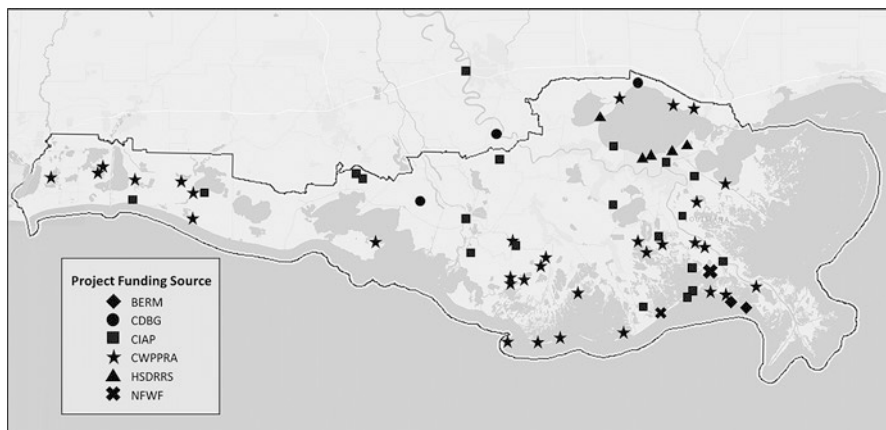
Though the 2017 Coastal Master Plan contains a number of grim warnings about the future of the state's coast, Louisianans are not unfamiliar with the risks posed by shoreline erosion. As early as the 1970s, scientists and researchers began warning government officials and the public about the potential impacts of losing the marshes and swamps that make up large sections of the state's coastal topography. In 1972 and 1973, the Louisiana Advisory Commission on Coastal and Marine Resources published three reports examining the loss of coastal wetlands and the potential negative consequences (Louisiana Advisory Commission on Coastal and Marine Resources 1972, 1973a, 1973b). Five years after the commission's reports, legislators passed the State and Local Coastal Resources Management Act of 1978 in an effort to manage development in 19 coastal parishes and help protect the wetlands ("Managing Our Coastal Resources" 1980). Two years later, the federal government approved a coastal management plan (CMP) that included a Coastal Use Permit system to provide additional oversight of activities in the coastal zone (Louisiana Department of Natural Resources 1980).

Although the National Environmental Policy Act of 1969 increased the ability for residents to challenge projects based on environmental and social impacts through the Environmental Impact Statement process, these early coastal policies and practices in Louisiana largely adhered to the more traditional public input process of having comments made on a report instead of public involvement in the design of projects. These initial efforts produced single-purpose project designs that restricted the vision of engineers and scientists to addressing the primary objective, whether it was flood protection, converting wasteland to productive real estate, or species perpetuation (Colten 2017). Initial efforts to manage coastal resources in Louisiana, for example, focused on species-specific habitat enhancements and often involved the manipulation of tidal regimes to maintain water levels to provide access and encourage growth of particular forage vegetation (Reed 2009).

After the CMP's acceptance in 1980, relatively few significant advances in policy implementation or administration of coastal restoration occurred for the next 9 years. However, at the end of the decade, two important policy proposals became law. First, Louisiana voters approved a constitutional amendment in 1989 that established the Wetlands Conservation and Restoration Trust Fund (WCRTF), which was intended to provide a reliable source of money for restoration projects in the state (McMahon 1989). The second notable policy development took place in summer of the following year when Senators John Breaux and J. Bennett Johnston ushered a bill through Congress that finally brought federal dollars to the state's coastal erosion crisis. Signed by President George H.W. Bush in November 1990, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA or Breaux Act) provided dedicated funding, meaning the state would not have to request money from Congress every fiscal year. However, the amount of money CWPPRA could deliver was relatively small in relation to estimates for a fully funded restoration program reaching several billion dollars in the early 1990s (McKinney 1989).

While the limited amount of funding was a concern, CWPPRA did make some positive steps in other areas of coastal management and restoration. The legislation created a bureaucratic framework that could bring order to the piecemeal administrative regime that had troubled wetlands policy during the previous two decades. CWPPRA established a task force comprised of officials from the state of Louisiana and five federal agencies, including the US Army Corps of Engineers (USACE), Department of the Interior, Environmental Protection Agency, Department of Agriculture, and Department of Commerce. Each agency's secretary appoints a representative to serve on the task force, and every year the group selects a certain number of restoration projects to be funded under CWPPRA (Louisiana Coastal Wetlands Conservation and Restoration Task Force 1993). Furthermore, the law encouraged Louisiana to develop a conservation plan that included the goal of "no net loss" for wetlands in future developments along the coast. The two plans – conservation to prevent future losses and restoration to address ongoing losses – were intended to be complementary with regulations and allow for more comprehensive management of the coast (Coastal Wetlands Planning, Protection and Restoration Act 1990).

Unlike the majority of previous efforts, the CWPPRA process depends on project nominations from the public, state and federal agencies, coastal parishes, and other coastal entities such as ports. These project nominations are then reviewed by regional planning teams and technical teams and ultimately brought to the task force for funding decisions. This gives local communities the ability to have initial input into project selection before engineering and design even begins. During its first few years, CWPPRA tended to fund small, localized projects that primarily benefitted the immediate vicinity. Those smaller projects were successful, but they could not stop wetlands loss on a large scale over a long period of time (Louisiana Coastal Wetlands Conservation and Restoration Task Force 1996). As the severity of coastal land loss became apparent, broad-scale ecological restoration emerged as the dominant management regime in coastal Louisiana. A primary focus of ecological



**Fig. 5.2** Map showing existing restoration projects in the Louisiana coastal zone symbolized by funding source. Includes projects completed as of April 2018. (Project data retrieved from the Coastal Protection and Restoration Authority (CPRA) CIMS database)

restoration is to re-establish wetlands to a condition that will protect the region's ecology and major economic interests in the state (Colten 2017). Despite the broadening focus, however, these projects have tended to address single missions such as coastal protection or coastal restoration or were focused on geographically limited locations (Hemmerling 2017). Ultimately, these piecemeal efforts (Fig. 5.2) have had limited success and have not resulted in a net gain of wetlands (Peyronnin et al. 2013). In 1995, groups such as the Coalition to Restore Coastal Louisiana (CRCL) and members of the Louisiana Department of Natural Resources began to advocate for bigger projects that could address losses across the entire coast. In September of that year, the CWPPRA task force agreed that large-scale projects such as freshwater diversions and barrier island restoration should receive priority status on annual project lists. Going forward, the task force would dedicate two-thirds of its yearly project funding to large-scale projects and the remainder for small-scale projects (Anderson 1995a, b).

The shift to prioritizing large-scale projects was an important step toward more effective restoration projects, but officials still needed a single vision for Louisiana's coast to help officials oversee protection and development. In the mid-1990s, dozens of agencies had authority in and around the wetlands, and there was no unifying vision to guide their activities (Schleifstein 1996b). Both Louisiana and the federal government's approach remained piecemeal, even after several years of project development under CWPPRA. If the current approach were to continue, the estimates were that only 22% of future losses could be avoided (Anderson 1997; Louisiana Coastal Wetlands Conservation and Restoration Task Force and Louisiana Wetlands Conservation and Restoration Authority 1998; Schleifstein 1996a, b).

In response to such predictions, political officials in Louisiana's government and representatives from federal agencies initiated a series of meetings in 1997. The CWPPRA task force and the state's Wetlands Authority in the Governor's Office led

the process of developing a unifying strategy including inviting agencies such as the National Marine Fisheries Service and the Louisiana Department of Environmental Quality to participate in the process. The group's goals were to build a consensus about what Louisiana's coast should look like in the year 2050, ensure cooperation among the variety of agencies involved in coastal management, and determine how to administer a unified restoration plan (Horst 1997a, b; Louisiana Coastal Wetlands Conservation and Restoration Task Force and Louisiana Wetlands Conservation and Restoration Authority 1998). Over the course of 18 months, public officials met with concerned citizens 65 times to determine what coastal users wanted to see in a restoration plan (Louisiana Coastal Wetlands Conservation and Restoration Task Force 1999).

The Coast 2050 task force built on previous plans but also made sure that the best available science guided their decision-making for future restoration policies. The Coast 2050 Plan was largely a vision document that pointed out challenges and potential solutions. However, it stopped short of listing specific projects and instead focused on strategies such as "maximize land building in Atchafalaya Bay" or "lower water levels in upper Penchant marshes." The final proposal emphasized striking a balance between wetlands protection and economic development and recognized there were multiple interests invested in using Louisiana's coast for a variety of purposes (Dunne 1998). Participating agencies agreed that there was no way to return Louisiana's coast back to the way it had been prior to the 1930s, but there was a consensus that a smaller, sustainable wetlands ecosystem was possible (Gagliano 1994).

The official response to the *Coast 2050* report was largely positive. All 20 coastal parishes formally endorsed the plan, and Governor Mike Foster voiced his support for the adoption of *Coast 2050* as a unified coastal management strategy (Schon 1998). In 2002, the state partnered with the US Army Corps of Engineers to further refine the *Coast 2050* plan and develop a coastwide comprehensive restoration plan under the existing Louisiana Coastal Area (LCA) planning authority (Day et al. 2007; Reed 2009). The resulting LCA Study produced detailed analyses of the costs and benefits of various groupings of restoration projects and included a list of critical restoration projects, many of which had already undergone planning through the CWPPRA process (Reed 2009).

Despite the scientific advances made in these early unified plans, there was still the issue of who would pay the billions of dollars necessary to implement a coastwide restoration and management plan. Some progress was made in funding Louisiana's coastal restoration efforts in summer 2005 when Congress approved the passage of a Coastal Impact Assistance Plan (CIAP). The program was designed to provide revenues to states that contributed to oil development in the Outer Continental Shelf (OCS), and nearly \$1 billion in expected revenues would be split among six states. Louisiana's share was estimated to be around \$540 million. The funds would be distributed starting in 2007 and could only be used for projects related to coastal erosion and mitigation of the impacts of Outer Continental Shelf (OCS) oil and gas development (Alpert 2005; Radtke Russel 2007).

However, just a few weeks after Congress approved the law containing CIAP, the devastation caused by Hurricanes Katrina and Rita changed the trajectory of coastal restoration in the state. The hurricanes led to the loss of approximately 1800 lives in Louisiana and resulted in \$200 billion in damages along the Gulf Coast (Louisiana Governor's Office of Homeland Security and Emergency Preparedness 2015). New Orleans was submerged under water when the city's hurricane protection levees failed during Katrina, and removing the floodwaters took over 40 days. More than one million Louisianans were displaced from their homes in the aftermath of the hurricane (Knabb et al. 2005). This displacement was not equally distributed across the population, nor was recovery. In New Orleans, for example, it was found that black residents were less likely to return to their homes after the storm than white residents primarily because the storm did the most damage in those low-lying areas of the city disproportionately populated by black residents (Groen & Polivka 2010). This in turn reflects historical environmental inequities as black residents were relegated to the low-lying and more vulnerable areas long before the storm ever hit, highlighting that social justice for the future depends on decisions that are made in the present. Katrina thus brought issues of social vulnerability and justice to the forefront of coastal protection and restoration science and marked a dramatic shift in the state approach to coastal planning and urgency of generating more effective policies.

### ***5.2.2 Post-Katrina: Establishing CPRA and Louisiana's Coastal Master Plan***

While residents fled to other locations or struggled to rebuild in the wake of the storms, state officials took action to address some of long-standing administrative issues regarding coastal restoration. Governor Kathleen Blanco signed Act 8 into law in November 2005, which created the Louisiana Coastal Protection and Restoration Authority to replace the Wetlands Restoration and Conservation Authority. The new body was directed to coordinate "the efforts of local, state, and federal agencies to achieve long-term comprehensive coastal restoration and hurricane protection." Act 8 also charged the CPRA with creating a "Master Plan that presents a conceptual vision of a sustainable coast based on the best available science and engineering." Projects related to CWPPRA, the LCA near-term plan, and funds from the CIAP were forthwith to be organized "toward a common goal" (Louisiana Coastal Protection and Restoration Authority 2007). Legislators asserted that "the state must have a single agency with authority to articulate a clear statement of priorities," and that "without this authority, the safety of citizens, the viability of state and local economies, and the long-term recovery from disasters such as Hurricanes Katrina and Rita remain in jeopardy" (Louisiana Act No. 8 2005).

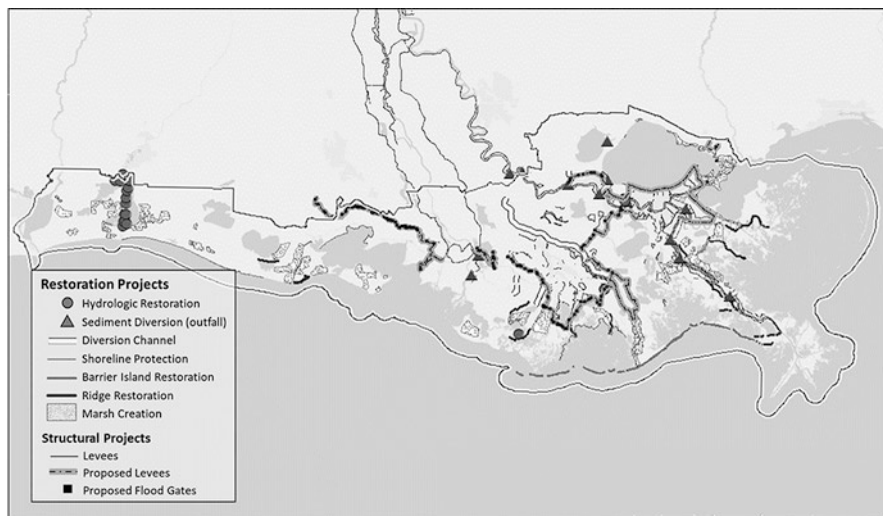
In fall 2006, voters approved a constitutional amendment that replaced the Wetlands Conservation and Restoration Trust Fund with the Coastal Protection and



Restoration Fund. They also approved a measure that directed all potential income from any OCS revenue-sharing scheme into wetlands conservation, coastal restoration, and hurricane protection (Sentell 2006). The revenue-sharing amendment was passed in anticipation of Congress authorizing the Gulf of Mexico Energy Security Act (GOMESA) in 2006. In contrast to CWPPRA or the 2005 CIAP, GOMESA was designed to provide a much larger scale of funding over a longer period of time (Walsh 2006). Though GOMESA promised another important source of funding for restoration in Louisiana, coastal advocates warned even that large amount of money was insufficient for the scope of the problem. Mark Davis, then with CRCL, praised the new revenue from GOMESA and said it was “hugely important, but it’s also hugely important to know that it’s only a down payment” (Shields 2006).

Another significant development happened in 2006. The state legislature had charged the CPRA with developing a Coastal Master Plan to be updated every 5 years, and the committee worked throughout the year to accomplish that goal. To maximize the benefits of coastal projects and comprehensively address both restoration and protection, the CPRA began to focus on the development of unified restoration plans that acknowledge the systematic complexity of interrelated issues in Louisiana’s coastal zone and developed more coordinated, integrative frameworks. These frameworks utilize a multiple lines of defense strategy that incorporates a broad suite of structural, nonstructural, and coastal restoration features, including the Gulf of Mexico shelf, the barrier islands, the sounds, marshland bridges, natural ridges, manmade ridges, flood gates, flood levees, pump stations, home and building elevations, and evacuation routes (Lopez 2009). The unified restoration plan approach has culminated with the development of Louisiana’s *Coastal Master Plan for a Sustainable Coast*, a numerical model-driven plan built on previous efforts and based upon a theoretically unbiased evaluation of hundreds of previously proposed projects, including nonstructural measures, under both current and future conditions (Fig. 5.3; Peyronnin et al. 2013). While this plan involved extensive public comment periods, public meetings, stakeholder meetings, and presentations, the science-based numerical models do not incorporate these comments. Instead, the comments are made after the plan is drafted and adjustments are made at that time. The difference between outreach, which the planning effort does well, and community engagement, which is still lacking, can make it difficult to meaningfully include social justice issues into the decision-making process.

A preliminary draft of the 2007 Master Plan was released in November 2006 and included a tentative vision for merging coastal restoration and hurricane protection. The draft also proposed some recommendations that had been previously seen as politically toxic such as closing the Mississippi River Gulf Outlet (MRGO). The state had requested that the Corps close the MRGO before the 2005 hurricane season, but the federal agency had been reluctant. A small number of shippers still used the channel; however, after Katrina, decommissioning the MRGO seemed more feasible. There were concerns that the navigation corridor had acted as a “super highway” for storm surge, and officials in St. Bernard Parish welcomed the closure (Committee on Homeland Security and Governmental Affairs 2006; Freudenburg et al. 2009; Schleifstein 2006). Other proposals in the initial draft report faced



**Fig. 5.3** Map showing Master Plan 2017 projects symbolized by project type. (Project data retrieved from the Coastal Protection and Restoration Authority (CPRA) CIMS database)

criticism, particularly in relation to the heavy emphasis placed on using levees for hurricane protection. Indeed, levees had contributed to coastal erosion and then failed to perform adequately during Katrina due to improper designs and maintenance and because Congress had not appropriated the necessary funds so there were incomplete portions of the system. In response to the critiques that the CPRA received in regard to its initial draft release, the committee revised the Coastal Master Plan to rely less on levees for hurricane protection and pursued something closer to the multiple lines of defense strategy which envisioned a series of speed bumps from barrier islands to interior marsh restoration and to restorations of ridges and including levees.

Much of the 2007 Master Plan was visionary rather than a list of specific projects to pursue, and in that sense, the document resembled Coast 2050. There were some specific suggestions such as closing MRGO or building the Morganza-to-the-Gulf levee system (Louisiana Coastal Protection and Restoration Authority 2007). Overall, the CPRA's first Master Plan, which was accepted by the state legislature in March 2007, was a blueprint for the future (Schleifstein 2007). To implement more specific actions, the CPRA would release annual reports with more targeted suggestions (Louisiana Coastal Protection and Restoration Authority 2007). All ongoing projects – including ones conducted under the CIAP, the CWPPRA, and the Corps – needed to be consistent with the state's Master Plan (Louisiana Coastal Protection and Restoration Authority 2008).

Overall, reception of the 2007 Master Plan was mixed. Though the plan was not a radically innovative proposal, integrating restoration with hurricane protection was a new step. Further, there seemed to be an increased commitment to funding a

plan that treated both activities as related after Hurricane Katrina. However, a review panel criticized the state over the “breakneck pace” at which the CPRA’s Integrated Planning Team “attempted to craft solutions for a complex and all-important task.” Other observers took issue with some of the proposals in the plan that were based on questionable scientific evidence. Technical reviews made clear that more complex modeling and scenario analyses were needed and in response the CPRA ramped up its scientific analysis and modeling efforts (Wiegman et al. 2018).

In preparation for the 2012 update to the Coastal Master Plan, the CPRA developed several new models that were linked to predict change in the Louisiana coastal system under two types of future management strategies: a future without the implementation of future protection and restoration projects and a future with implementation of individual projects (Peyronnin et al. 2013). This systems-based numerical modeling approach relied heavily on a decision support tool designed to provide an analytical and objective basis for comparing projects and developing alternative groups of projects for consideration in the final plan. Candidate projects were selected by mining earlier studies, reports, presentations, and plans to develop a final list of 397 candidate projects.

In 2012, the state released its first legislatively mandated update to the 2007 Master Plan, which included an assessment of the progress achieved in coastal restoration. Over the previous 5 years, the CPRA had administered projects related to building or improving 159 miles of levees, constructed 32 miles of barrier islands or berms, placed 150 in design or construction, and benefitted over 19,000 acres of wetlands (Louisiana Coastal Protection and Restoration Authority 2012). By 2014, 45 miles of barrier islands or berms had been built, and coastal restoration and protection programs had benefitted 26,241 acres of land. As of 2015, the state planned to monitor or maintain 230 projects, while overseeing the design and construction of 79 more (Louisiana Coastal Protection and Restoration Authority 2016). Overall, the CPRA reported that the rate of shoreline erosion was down significantly from its height in the 1970s. Despite the progress made, however, the state was still losing approximately 16 square miles of land per year, highlighting the importance of continued coastal restoration planning (Louisiana Coastal Protection and Restoration Authority 2012).

The 2017 update to the Master Plan was largely based on the same framework established in 2007 and reaffirmed in 2012. Coastal restoration projects will remain under the oversight of the CPRA, but the latest iteration of the Master Plan does contain an increased emphasis on nonstructural means of combatting storm-related flooding (Louisiana Coastal Protection and Restoration Authority 2017). Furthermore, officials appear to be less optimistic about the future of the coast in the 2017 update, citing increasing concerns about climate change. New Orleans and other low-lying areas in southern Louisiana are expected to become even more vulnerable to flooding and storm-related damages as sea levels rise in response to the warming planet (Marshall 2017). Worse, the funding problems that have undermined coastal restoration efforts since the 1970s have not been resolved. Louisiana has long been planning to use GOMESA funds to help pay for projects beginning after 2017. The state expected to get approximately \$140 million in the first year but

is currently slated to get half that amount. As a result, projects scheduled to begin in the 2019 fiscal year may have to be scaled back or placed on hold while officials search for additional funding (Schleifstein 1996b).

### **5.3 Shifting Costs and Benefits of Protection and Restoration: Coastal Planning as a Matter of Social Justice**

The benefits of the Master Plan and other similar unified restoration plans are without a doubt broad and sweeping. These plans do, however, acknowledge that it is not possible to provide the same level of benefits to all coastal communities. Coastal management literature argues that while structural defenses can be justified in urban areas, they often fail to meet the cost-benefit test in thinly settled, rural locales (Colten et al. 2018). In coastal Louisiana, for example, much of the at-risk Native American populations reside in the small rural communities located along the land-water interface, as do many other minority communities who rely on subsistence fishing to supplement household resources. These communities, due to their proximity to the coast and their rural nature, make them especially vulnerable to natural hazards and risks (Dalbom et al. 2014). They also reside in locations where the construction of structural protection features is largely untenable. But it's not only geography that makes them vulnerable. Histories of displacement, segregation, and political disenfranchisement have made many Native communities economically under-resourced and comparatively less politically powerful than urban, white populations in south Louisiana.

When taken together, the historical and contemporary contexts that situate the negative outcomes for residents residing in small rural communities in the coastal zone are potentially magnified in areas that are highly dependent upon fisheries and other natural resources for their economic well-being. Changes in the distribution and abundance of species, for example, will likely have socioeconomic effects on fishers, hunters, and other harvesters who use the wetlands for commercial, subsistence, recreational guiding, and recreational activities. Fish and wildlife will likely adapt quickly, whereas it is harder and takes longer for resource harvesters to adapt (Peyronnin et al. 2017). This is a particular concern in coastal Louisiana, where projects focused on protecting the maximum number of residents over the long term are also projected to disrupt ecological conditions that sustain the natural resources that many coastal residents rely in the short term, creating a number of unique social justice concerns (Colten et al. 2018).

The shift from small-scale, localized projects to a science-driven, unified restoration plan has the potential to dramatically change the appearance of the coastal landscape, both natural and human (Table 5.1). Broadly speaking, numerical models are used to identify a suite of protection and restoration projects that will synergistically derive the greatest benefits for the greatest number of residents. In this

**Table 5.1** Restoration planning and policy outcomes

Type of restoration planning	Louisiana examples	Policy outcomes	Advantages	Disadvantages
Small-scale projects	CIAP, CWPPRA (pre-1995)	Local areas benefit; short-term impacts	Individual communities benefit directly; multiple points of view considered	Multiple agencies involved in execution, which results in conflicting agendas; unable to stop net loss of wetlands over time
Large-scale projects	CWPPRA (post-1995), state of Louisiana, USACE	Broader areas benefit; short-term and long-term impacts	Individual communities and broader areas benefit directly; multiple points of view considered	Multiple agencies involved in execution, which results in conflicting agendas; unable to stop net loss of wetlands over time
Unified coastal restoration	Coast 2050, Coastal Master Plan for a Sustainable Coast	Mixture of area sizes benefit, but emphasis is on coastal ecosystem; short-term and long-term impacts	Streamlined administration; coastal ecosystem prioritized to slow overall losses	Viewpoints of individual communities have less influence and receive less attention; unable to stop net loss of wetlands in the near term

approach, each numerical model derived for the analysis provides input to other models, produces outputs, and estimates how the landscape.

might change and how projects might perform on the landscape over time (Peyronnin et al. 2013). The idea that the final model outputs potentially identify that suite of projects that provide the greatest level of social benefit presents a powerful justification for comprehensive master planning efforts. An analysis of the 2012 Master Plan estimated that, if fully implemented, the planned risk reduction projects would provide heightened protection to over 86% of families and nearly 85% of poor families in Southeast Louisiana (Dalbom et al. 2014). This same study reveals that, by extending protection to the majority of the population residing in the developed areas of the coastal zone, the 2012 Master Plan will simultaneously reduce the anticipated level of risk for the urban African American, Asian, and Hispanic populations of the region.

However, there are social costs associated with the shift to a purely science-based approach to project selection. While all restoration and protection plans accept that change is inevitable across the coast, more recent science-driven plans are less constrained by the impacts of these changes on local populations (Reed 2009). As a result, some of the poorest and most geographically marginal coastal groups are often outside the purview of restoration and protection. This situation raises the question of how policy makers can fairly distribute the benefits and burdens of coastal restoration (Colten et al. 2018). As a result of a purely science-driven planning process, the impacts of protection and restoration projects on individual

communities are devalued as building and maintaining land and reducing risk on a broad scale become the key decision drivers for selecting projects (Peyronnin et al. 2013). Indeed, while Louisiana's Master Plan is couched in terms of sustainability, it does not propose sustainability for all (Colten 2015). Because one of the primary goals of the Master Plan is to provide protection to the greatest number of individuals, many of the proposed projects will prioritize providing protection to urban residents and those residing in more densely populated areas. In short, as many coastal residents attest to, this approach to project selection runs the risk of sacrificing remote coastal areas home to already socio-spatially marginalized groups for the protection of environmentally viable urbanized coastal regions. This impacts a disproportionate number of small business and subsistence fisherfolks from Native American, African American, southeast Asian, and other minority groups as well as white residents with long histories of occupancy of the rural coastal areas.

Mapping onto existing geographies of racial and ethnic difference and economic inequality, the uneven distribution of risk and anticipated siting of protection projects raises the issue of social justice to the fore of contemporary coastal planning. An issue largely unexplored in Louisiana (Colten et al. 2018), social justice is comprised of three key elements, each of which can be impacted by coastal restoration programs in distinct ways: distributive justice, procedural justice, and contextual justice. The degree to which the outcomes of environmental projects address each of these elements can have a decisive impact on both the overall equity of the outcomes of the program and ultimately whether these efforts succeed or fail (Fischer et al. 2015).

### ***5.3.1 Distributive Justice***

Scholars have noted that the last several decades of research into social justice have focused largely on one key dimension: distributive justice (McDermott et al. 2013; Schlosberg 2004). This dimension focuses on the allocation of material goods, including environmental quality, and generally conceives of social justice and distribution as equivalent concepts (Dobson 1998; Foster 1998; Pulido 2000). Distributive justice, as it relates to coastal restoration and protection, focuses on the allocation among coastal residents of costs and benefits resulting from environmental policy, resource management decisions, and environmental modifications (McDermott et al. 2013). Advances in high-end computing, numerical modeling, and geographic information systems (GIS) have allowed coastal researchers to develop innovative analytical techniques to measure and forecast the impacts of environmental change on broad spatial and temporal scales. Through these techniques, the efficient distribution of social costs and benefits can be measured and used to assess the ability of environmental programs to maximize the social welfare that can be achieved under given biogeophysical and financial constraints.

Under the distributive justice framework, the costs and benefits of environmental adaptations may be unequally distributed among individuals for the sake of net

social gain for the entire population (McDermott et al. 2013). Socioeconomically neutral coastal adaptation planning refers to the advancement of protection and restoration projects on the basis of scientific processes. This approach overlooks racial and economic inequality and the history of environmental inequity in both settlement and risk patterns. Climate change adaptation plans based upon socioeconomically neutral, physical science-driven numerical models can create winners and losers, potentially shifting the distribution of benefits or risks from one group to another (Lebel et al. 2009). The purely distributive focus of these models – greatest good for the greatest number of people – obscures the role that social structure and institutional context play in determining the patterns of distribution (Foster 1998). If such contextual issues go unrecognized, adaptation planning built upon science-driven numerical models may lead to restoration and climate change adaptation plans that benefit some populations while abandoning others (Hardy et al. 2017). Such measures may even exacerbate injustice, as when actions designed to maximize protection in urban areas or protect critical assets and infrastructure make some disadvantaged groups even more vulnerable than they were before (Lebel et al. 2009).

### 5.3.2 *Procedural Justice*

The limitations of a distributive justice framework for understanding environmental (in)justice are elaborated by scholars concerned with the ways existing and new social and economic inequalities are entrenched by practices for managing environmental hazards (Pulido 2000, 2015). By downplaying or ignoring the historical processes and causes that result in an inequitable distribution of risks and benefits across the coast, science-driven adaptation plans may inadvertently exacerbate existing inequities. The question then becomes whether promoting procedural justice by instituting inclusive, participatory processes within coastal restoration planning makes it possible to correct for any unfair distributional outcomes and potentially address causal origins (McDermott et al. 2013). The concept of procedural justice shifts the focus from the actual distribution of the costs and benefits of coastal restoration projects to the fairness of the process by which these costs and benefits are allocated and decisions are made (Clayton 2000). It involves recognition, inclusion, representation, and participation in the decision-making process by local residents and potentially impacted stakeholders (Ishiyama 2003; McDermott et al. 2013). Ultimately, reducing the risk of exposure to coastal hazards, both physical and economic, requires engagement with residents and stakeholder groups likely to be affected by policy actions and those who are especially vulnerable to risk. Engagement, in this sense, goes beyond legally mandated public comment protocols. Instead, aspirations to procedural justice would aim to give significant weight and representation to marginalized voices at all levels of the planning process and final decision-making.

### 5.3.3 *Contextual Justice*

To accurately assess the social impact or fairness of a project or program, it is necessary to identify not only the outcomes and processes of implementation but also the initial social conditions and origins of any existing environmental inequities (McDermott et al. 2013). Coastal planners need to understand current political processes and distributive outcomes within a historical context and address the fact that, in many cases, the playing field is already highly skewed against local communities due to a number of economic and social disadvantages (Larson and Ribot 2007). Such disadvantaged communities face a number of technical and bureaucratic hurdles that other communities may not face, often compounded by a lack of access to vital information and an inability to pay for needed technical expertise. For example, the lower a resident's income level, the less likely they are to be familiar with proposed restoration projects that could directly impact them and the more likely they are to think that the project will not change fisheries (Gramling et al. 2006). Without a clear understanding of the historical processes that have led to these disadvantages, coastal policy and implementation practices run the risk of exacerbating existing environmental inequities. An understanding of contextual justice, as it relates to coastal protection and restoration, takes into account those pre-existing conditions that limit a community's access to decision-making procedures, resources, and benefits, effectively serving as a link between distributive and procedural justice (McDermott et al. 2013). Ultimately, to navigate these issues and effectively redress historical injustices while also promoting effective coastal planning, more and better knowledge is required about the development of those preexisting political, economic, and social conditions that limit people's capacity to engage in and benefit from the coastal planning process (Fischer et al. 2015). By incorporating aspects of contextual equity into the planning process, policy makers are more likely to identify uncover impacts that are harder to measure but are often crucial to local welfare (McDermott et al. 2013).

## 5.4 Public Participation in Coastal Planning

Within a procedural and contextual justice framework, those most at risk should be given opportunities to participate in reshaping and reducing risk to which they are to be exposed (Lebel et al. 2009). Echoing work in environmental justice (Checker 2011; Ishiyama 2003), such an approach must go beyond participation and token integration of marginalized voices to generate meaningful and politically efficacious modes of interaction in policy development that does eschew or co-opt the self-determination of less populated and economically marginal coastal areas.

The importance of public participation in the restoration planning process has been acknowledged by the state of Louisiana in the development of the Master Plan, which developed a set of four key outreach and engagement principles to ensure



structured and transparent interactions with the public as well as key businesses and industries, federal agencies, nonprofits, academia, and fisheries interests. Key goals outlined for the state in both the 2012 and 2017 Master Plans include:

1. Stakeholders and citizens should be given opportunities to learn about and comment on the 2017 Master Plan tools and the processes that assist in creating the plan – not just the finished plan itself.
2. Comments and ideas should be received, reviewed, and incorporated while the 2017 is being developed, not after the fact.
3. Not every stakeholder or citizen preference will be included in the 2017 Master Plan. However, the state promises that each idea will receive a fair hearing and that questions will be answered promptly and with care.
4. The state has an obligation to provide a variety of ways for stakeholder and citizens to learn about and participate in the master planning process, including small group gatherings, web offerings, direct communication with local and state government, and public meetings (Speyrer and Gaharan 2017).

These goals highlight CPRA's desire to capture a wide swath of public feedback on the Master Plan. Further, they reflect that the state understands the persistent frustrations of citizens across the coast that they are engaged too late in the planning process and that their comments make little difference to what the state decides to do.

In developing the 2012 Master Plan, the CPRA attempted to respond to these staunch and persistent critiques through the development of numerous stakeholder groups and citizen outreach tactics. Stakeholder groups engaged with in the planning process included the following: (1) a Master Plan framework development team, residents from Louisiana representing federal, state, and local governments, NGOs, business and industry, academia, and coastal communities (this group was comprised of 33 members that met on an almost quarterly basis to review ongoing research and project selection processes for the Master Plan; (2) a fisheries focus group composed of approximately 15 members in the commercial fishing industry; (3) a group of about 10 members representing the oil and gas industry; and (4) a group of approximately 15 members representing navigation interests. These groups were variously consulted over the development of the 2012 Master Plan in order to assess the impacts of potential projects upon these industries. There were a handful of coastal citizens who participated in these groups, but the majority of participants were selected because of their professional and political affiliations.

The process for public engagement entailed numerous public meetings and official hearings for the 2012 Draft Master Plan. At the outset of the planning process, the CPRA held ten regional community meetings throughout the coast. Approximately 600 citizens participated these meetings, which were designed to gather local knowledge and identify public priorities and concerns. Additionally, the CPRA conducted a statewide telephone poll to elicit information from over 1000 additional residents. The results of the initial community meetings and polling indicated that, regardless of where they live, citizens were concerned about land loss, reducing flood risk, and the future of coastal fisheries (CPRA 2012). Input from these meetings was catalogued and posted to their public site alongside suggestions

for citizens to become involved in the planning process. In total, community meetings, public forums, civic presentations, a community survey, and a telephone poll were used by state decision-makers to gather information on citizen preferences and ideas that could be incorporated into the decision-making process (Peyronnin et al. 2013).

Upon completion of the draft Master Plan in January of 2012, the CPRA hosted three additional public hearings to receive comments on the plan. The state received over 100 formal comments during these hearings and over 2200 additional comments received subsequently via email, website, and mail. After collecting comments, the CPRA had approximately 1 month to evaluate and address project-specific concerns before sending off a finalized version to the state legislature to vote on for approval. Comments related to both policy and implementation were also evaluated and catalogued to help guide the state as Master Plan projects and programs begin to be implemented in the future.

Accounting for how public comments become incorporated into and/or influenced the Master Plan was addressed in 2012 through specific tactics the CPRA used to test particular projects. As the Master Plan notes, projects were adjusted “based on local knowledge and stakeholder input where appropriate. The changes were principled responses to the feedback we received, grounded in science, and responsive to the needs of our coastal communities” (CPRA 2012, 112). The state noted that they considered all public comments, categorized them by major theme, and provided responses to each theme, specifically identifying the policy- and project-level adjustments to the final plan (CPRA 2012). Changes were reflected explicitly in several structural protection and flood risk reduction projects that were either added or adjusted in the final plan, based upon a combination of policy constraints, public input, and scientific models. For example, the CPRA used public comments to test preferences for and against large-scale river sediment diversions. Using data generated by seven integrated predictive models, nine decision criteria, and various project implementation constraints, the CPRA evaluated the presence and removal of several sizes of river diversions and evaluated what different public preferences for diversion sizes and locations would be.

Goals and approaches to the 2017 Master Plan were similar to 2012, but with several key changes. First, the state introduced a community focus group as one of the handful of advisory groups they met with regularly during the plan development. Community groups included leadership from local Native American tribes, community organizations serving Vietnamese fishermen, and organizations serving predominately African American communities in rural coastal areas. They met four times between April 2013 and October 2016, having anywhere from 4 to 15 members in attendance. Beyond CPRA presentations, participants in the focus group primarily discussed interest in attaining small grants for local community organizations to help with CPRA education and outreach, explicit concern for projected land loss in certain Native American communities along the coast, and how projections of future flood risk might impact low to moderate income populations on the coast (Speyrer and Gaharan 2017). Concern for expanding the geographic scope of community engagement was also a frequent topic of discussion between community

focus group members and CPRA officials as was defining the scope and content of what nonstructural projects – such as home elevation, flood proofing, and relocation – would be. This latter point is particularly important among the community focus groups as most participants are residents of small coastal communities located outside the extensive levee and flood wall protection.

While the community focus group was not framed explicitly by the CPRA as an attempt to engage minority communities, in practice it was the most consistent and strategic engagement the state made with representatives from minority communities. In the context of coastal planning in Louisiana, there is no explicit representation or study of minority or economically marginalized communities within research that informs the Coastal Master Plan. Meetings with the community focus group reflect the ethos of socioeconomically neutral planning techniques that utilize a non-specified, generic notion of “community” as a stand-in for representing the experiences of marginalized communities without naming racial, ethnic, economic, or other forms of difference – let alone social justice – as a key motivation for the generation of the community focus group. For example, the needs and challenges inside bay subsistence and small-scale commercial fisherfolk face with impending coastal restoration projects and their changes to regional ecologies are distinct from those that local homeowners face: For one group, environmental changes for restoration mean potentially going out of business or taking on the financial burden of developing new fishing practices. For the other, those same environmental changes point to the possibilities of high flood risks for private property, a financial burden many might not be able to shoulder. Beyond these basic examples of difference within the generic category of “coastal communities,” review of CPRA documents shows that it is unclear how and if this particular focus group, or any of the advisory councils CPRA engages, actively shapes the projects and decision-making frameworks that the state utilizes to develop coastal policy.

The CPRA also established several other focus groups, including landowners and parish floodplain managers. Inclusion of these groups reflects the state’s gradual expansion of the stakeholder and resident types who they believe need to have a sustained engagement in the master planning process beyond limited public hearings. The state also began to publish materials in Vietnamese, Spanish, and French and developed a series of online flood risk and other informative tools in order to reach more diverse audiences around the coast. While communication techniques are crucial, they do not necessarily equate a more robust engagement with the coastal public or incorporation of social justice concerns into planning. They might, however, increase the likelihood that state representatives will develop a more consistent relationship to different groups and perhaps incorporate changes to Master Plan projects derived from coastal communities in concert with numerical models and scientific expertise.

As with master planning initiatives in 2012, the CPRA partnered with NGO groups to organize public meetings and series of open houses prior to the official public comment period that commenced in January 2017. In October and November 2016, the CPRA held community meetings in several coastal communities to solicit early feedback on draft lists of potential projects for the 2017 Master Plan in

response to increasing public pressure to give individual citizens who are not members of select advisory or focus groups more opportunities to vet Master Plan ideas prior to the production of the draft Master Plan. According to CPRA, approximately 500 people attended 7 meetings held across the coast (Speyrer and Gaharan 2017). There is no information on the demographic or geographic composition of the crowds, and it is difficult to assess how, exactly, more meetings correlate to a plan that more effectively represents the diversity of values and interests associated with protection and planning projects.

Establishing new focus groups that include community organizations, landowners, parish floodplain managers, and commercial fishing interests and doubling engagement efforts (including expanding the range of linguistic outreach to access southeast Asian and Latino residents) reflects a recognition that the impacts of the Master Plan are geographically and economically diverse. Reluctance to name social, racial, or economic justice as a matter of concern for coastal planning, however, reflects that the state envisions coastal restoration as something that operates outside of explicitly racial, economic, geographic, and social disparities and histories. Recent efforts by the CPRA strive to achieve social justice through a scientific model-based distributive justice framework but often do little to address historical and ongoing power inequalities that circumscribe small coastal communities to disproportionately bear the burdens of environment risks. While public participation has been ramped up from 2012 to 2017, the extent of addressing social, economic, and spatial inequity in coastal planning remains vague.

## 5.5 More Meetings and Public Participation, More Justice?

Despite ongoing efforts by the state of Louisiana to actively engage with local residents and incorporate aspects of procedural justice into the restoration planning process, many community groups have condemned the process as exclusionary and undemocratic (Gotham 2016a). Additionally, many residents feel disenfranchised by what they perceive to be a repetitive and ambiguous public engagement process that often leaves them feeling fatigued, frustrated, and ignored by state policy makers and coastal planners (Carruthers et al. 2017). The stark contrast between the goals of the state's outreach and engagement plan and the experience of some coastal residents highlights an essential dilemma faced by CPRA and other coastal policy makers. Debates over coastal protection and restoration are not just about risk but represent struggles over access to resources and the power of residents to define and defend cultural forms (Gotham 2016b). The current focus on developing world-class, science-driven numerical models is perceived as coming at the expense of taking residents' concerns seriously. These same residents feel ignored or left to fend for themselves against the forces of nature and the economy because they are often the inherent "losers" of land loss *and* coastal planning. When used as a tool to substantiate the integrity and power of the state to make "decisions in the best interests of Louisiana's citizens," the coastal restoration planning process runs the risk of

reinforcing a longer history of state and federal governments justifying their power over environmental management practices in the United States that frequently results in the political, economic, and geographic displacement of politically and economically disenfranchised groups (Kosek 2006; Spence 1999; Hardy et al. 2017). The question of whether or not the government intends to have disproportionate impacts on socially, politically, and geographically marginalized groups is difficult to answer and obscures the fact that supposedly objective decisions about where and how to protect the coast often struggle to move beyond limited notions of distributive justice to address broader social justice and equity issues.

To be sure, coastal restoration has not historically been designed to remediate or define ways to cultivate social justice and equitability when it comes to addressing Louisiana's coastal land loss crisis. Instead, planners and scientists have used numerical models to justify and legitimize the selection of specific risk reduction techniques to protect broad swaths of the coast, while residents often use perceptions of increased threat and a fundamental distrust of government at all levels as a justification for locally rejecting many of these techniques (Colten 2015; Gotham 2016b). While Louisiana's most recent iterations of the Coastal Master Plan boost extensive public engagement efforts operating in parallel with the systems-based scientific analysis of coastal projects that forms the backbone of the protection and restoration plan, the capacity to effectively integrate these streams is not readily apparent to many frontline coastal communities nor is it apparent to external scientific working groups (Wells et al. 2015). Coastal residents continue to struggle with bureaucratic processes related to how restoration projects are nominated, prioritized, and selected and understanding where restoration efforts and funds are spent (Carruthers et al. 2017). This highlights the fact that simply increasing the number of people touched by public engagement may reduce levels of procedural injustice inherent in the restoration planning process, but it is not a guarantee that social justice can be achieved for socially or economically marginalized groups. Instead, increasing levels of outreach and engagement often appears to recapitulate notions of distributive justice which, by and large, does not resolve the fact that there will be, as state officials are partial to saying, "winners and losers" in coastal restoration and protection planning. The decision-making process is still largely top-down and guided by scientific models that do not reflect or have the capacity to change the power dynamics inherent in the restoration planning process itself. While the state has significantly increased and documented the number of public meetings that have been held as part of the restoration planning process, a mechanism of accounting for input derived from these meetings has yet to be generated. It is therefore difficult to assess the extent to which holding more public meetings, or creating different interactive formats for public meetings, will result in any change in outcomes for groups who disproportionately bear the greatest risks from coastal hazards and land loss. In short, increased engagement is not a guarantee of risk reduction.

At a minimum, outreach and engagement attempts can build trust with citizens, trust on the part of citizens that state officials have their best interests in mind. As the introduction to the 2017 Master Plan succinctly captures, "our goal is to develop public confidence that CPRA is the primary technical authority on coastal protection

and restoration for Louisiana and is making decisions in the best interests of Louisiana's citizens" (CPRA 2017, p.1). More outreach and engagement efforts aspire toward increased procedural justice and accountability to diverse coastal population and a genuine concern for coastal Louisiana's well-being. However, merely increasing levels of procedural justice does not necessarily result in increased social justice. If public participation drives the selection of certain specific projects that protect a small number of residents at the expense of a greater number of residents elsewhere on the coast, then it will have reduced the level of distributive justice, which is focused on maximizing net social gain for all residents of coastal Louisiana.

## 5.6 Mapping a Path Forward

Despite the power of incorporating local knowledge into the coastal planning process, to date it has been challenging to broadly implement due to difficulties in achieving scientifically rigorous, replicable, and widely accessible methods of data collection. In large part, projects that have taken such an approach have been wholly qualitative in nature, which, though valid, are still not as easily accepted across the sciences. However, with advances in geospatial technologies, a growing acceptance of mixed methods research, and awareness of the validity and importance of local knowledge, this situation is changing (Curtis et al. 2018). There is a growing literature on the potential of combining local knowledge systems with technical scientific knowledge to manage both ecosystems and resources, including the evaluation of climate change impacts and the management of fisheries, biodiversity, and landscape dynamics (Folke et al. 2005). The people who live and work in coastal communities are becoming recognized as repositories of valuable local knowledge of concentrated community risks that reduce capacity in preparedness, such as issues of safety, health, and education, as well as on the critical social infrastructure network that they would access in response and recovery. Community members also hold perceptions of risk that shape their preparedness and mitigation activities, such as which places in their community are dangerous and which are thought to be safe. Such local knowledge and environmental perceptions are often geographically explicit and are powerful influences on behavior (Curtis et al. 2018). It is essential that coastal planners account for these data to form a more complete evidence base in guiding the development of resilient coastal communities.

Several recent methodological advances that allow for the input of qualitative local knowledge into mathematical models have provided tangible ways to evaluate potential outcomes and shortcomings of ongoing and planned restoration and protection projects against projected results which can allow coastal planners to make adjustments that respond to the real-time needs of impacted communities. Methods such as local knowledge mapping, social return on investment, and competency groups have all been used in coastal Louisiana to collect, analyze, and map qualitative data with the goal of characterizing local community members' understanding

of what ecological restoration has historically achieved, as well as a suite of potential short- and long-term outcomes of emerging ecological restoration projects identified by residents. Results from these approaches provide a new, geographically targeted, evidence base for planning strategies, especially those focused on coastal protection and restoration. These approaches are not designed to directly address issues of social injustice or change public policy. Rather, they present examples for state agencies and policy makers to follow as a means of anticipating, understanding, and attempting to alleviate unequal impacts before they occur, an important first step in addressing many of the social justice issues faced by coastal residents.

### ***5.6.1 Local Knowledge Mapping***

Many science-driven planning processes, including Louisiana's Coastal Master Plan, rely upon quantitative, geospatial datasets as model inputs and to derive metrics as criteria for evaluating the effectiveness of protection and restoration projects. While these datasets are effective at locating any number of nonresidential, residential, and infrastructure assets at risk within an area, they are not able to specifically identify places that have social or cultural value to residents and communities. State planners recognize that protecting such places of value is vital to preserving the culture and identity of Louisiana's various coastal communities (Louisiana Coastal Protection and Restoration Authority 2012), yet modeling efforts have focused largely on the more tangible aspects of cultural heritage that can easily be captured by existing geospatial datasets, such as the presence of ethnic minority groups or historic properties. The overreliance on such datasets in the planning process, particularly when presented with no additional context, may result in any number of social justice outcomes. Local knowledge mapping is an approach that aims to encourage community member participation in sharing knowledge and perceptions of a given area and has been shown to provide an effective means of incorporating community and traditional ecological knowledge into a coastal protection and restoration framework. The incorporation of these data into the planning process would represent an important first step in ameliorating the impacts of past environmental inequities while reducing the risk of future disproportionate impacts on particular social or cultural groups. While local knowledge mapping typically involves having local stakeholders mark locations on paper maps, recent advances in mapping and in GPS-enabled technology that are low in cost, widely available, and accessible to the public have allowed researchers to directly gather geospatial data from local knowledge experts, which is particularly important when the pace and geographic scale of change is dynamic (Curtis et al. 2018). Qualitative data collected during local knowledge mapping exercises have been used to create a geospatially explicit baseline dataset allowing researchers to incorporate local knowledge into an assessment of ecological restoration projects. When incorporated into a GIS environment and assessed in combination with biophysical data, the resultant "Sci-TEK" data can potentially be used to refine the large conceptual footprints of restoration

projects and aid in the identification of future restoration projects and identify associated areas of consensus and potential conflict between local stakeholders and policy makers (Bethel et al. 2011, 2014, 2015). The information gained in this way has also been used to determine the geographic specificity of local perceptions and develop community-informed prioritization tools that can be used to plan future ecological restoration projects (Barra 2017; Carruthers et al. 2017).

### **5.6.2 Social Return on Investment**

Ecological restoration and other activities that interact with environmental systems have typically relied on scientific analysis to predict the impacts of these projects and have operated on the assumption that good science could reveal and remedy potential problems (Colten and Hemmerling 2014). Because coastal planning is fundamentally a human activity, however, effective predictions of human impacts demand equal attention to the social, political, cultural, and economic systems in which environmental management takes place (Ludwig et al. 1993). Protection and restoration projects deliver variable costs and benefits to Louisiana coastal communities and the economies they depend upon, such as navigation and fisheries (Caffey et al. 2014). Residents impacted by these projects have recognized these variabilities, valuing some projects as vitally important and highly desirable, while questioning or opposing others (Colten 2014). Qualitative data analysis can successfully classify differences in the ways stakeholder groups potentially impacted by ecological restoration projects engage with the project sites and identify a suite of outcomes unique to each stakeholder group. Identifying these outcomes is integral to defining both the specific objectives and variables needed to develop a comprehensive assessment and monitoring framework.

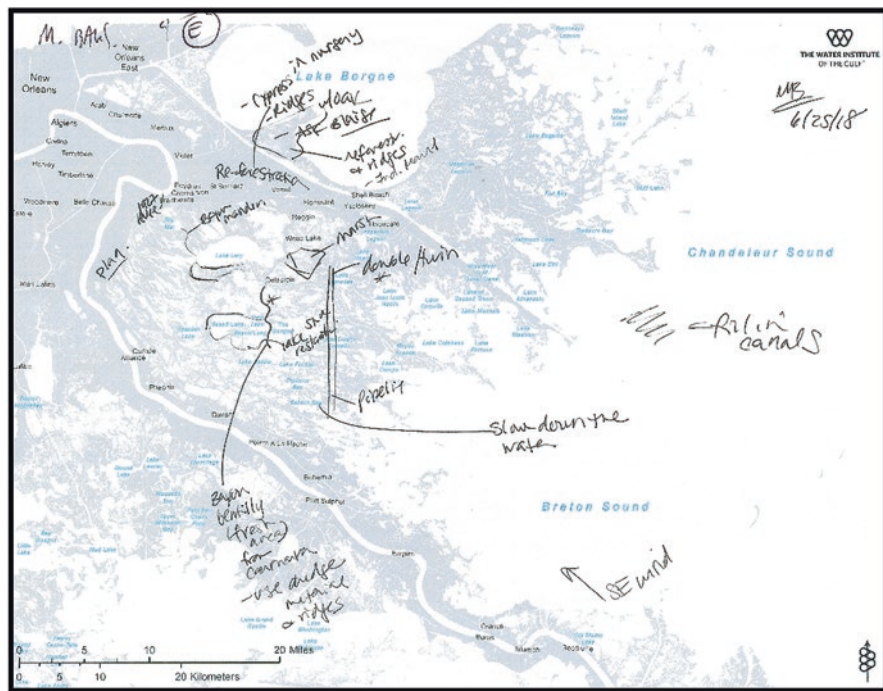
In order to quantify locally specific social impacts and develop a framework amenable to measuring social change resulting from ecological restoration, qualitative data derived from focus groups, surveys, and one-on-one interviews with a selection of key stakeholders have been used to develop empirically grounded forecast and retrospective assessments of protection and restoration projects (Hemmerling and Barra 2017). Recent restoration work conducted in coastal Louisiana by the Restore the Earth Foundation used qualitative research to inform the calculation of economic, recreational, cultural, educational, and ecological values of ecological restoration projects on numerous stakeholder groups (Hemmerling et al. 2017a, b). Interviews, survey methods, and focus groups were centered around these discrete topics to develop a consistent analysis across groups and a framework for future research and monitoring. Conversations with participants were analyzed to determine which qualities or concerns were important to participants as well as how they weighted different social and environmental values derived from the restoration projects. The qualitative data derived through this process can provide new insight into the social impacts of restoration that cannot be gained through traditional scientific approaches and identify potential inequities in the distribution of



costs and benefits. This knowledge can help to bound the uncertainty of a purely quantitative analysis and therefore makes it more useful in setting public policy and making cost-benefit decisions between different environmental interventions. The suite of methodologies used in this research can be translated into a longer-term monitoring program, tracking where and how different economically and geographically situated communities are unequally impacted by the changing material conditions that accompany restoration projects over time. Empirically derived information on residents' perceptions of the values – positive, negative, or otherwise – of restoration projects grounds anticipated social impacts in the material experiences of the residents themselves.

### **5.6.3 Competency Groups**

Despite recent efforts by public officials and scientists to actively engage with coastal residents and stakeholders, many of these residents still feel that their local knowledge is not ultimately accounted for in the coastal restoration planning process within their own communities (Carruthers et al. 2017). This is due in large part to the fact that science-based knowledge, including such expert devices as predictive models, risk indicators, monitoring instrumentation, environmental services calculations, and cost-benefit analyses, is still a priori granted priority over experience-based knowledge (Landström et al. 2011; Whatmore 2009). When this prevailing scientific expertise contradicts the direct experience and knowledge of coastal residents, knowledge controversies may develop, generating conflict and eroding public trust in both scientists and public officials. In coastal Louisiana, one such knowledge controversy has developed around the planned reintroduction of Mississippi River water and sediment into the Breton Sound Estuary in an attempt to mimic the natural functioning of the river delta (Barra 2016). Public opposition to this and other large-scale sediment diversion projects has developed around a number of perceived threats, including the over-freshening of coastal estuaries, displacement of fisheries, and assertion that nutrients in the river water will lead to wetland deterioration (Day et al. 2018). This location recently served as a pilot to investigate the utility of an innovative competency group approach to predictive modeling that utilizes a collaborative process to redistribute expertise between local residents and resource users, hydrological modelers, experts in numerical modeling, and members of an interdisciplinary project team. The scientists participating in the competency group were experts in numerical modeling who played key roles in the initial modeling of the sediment diversions, while many of the local residents were fishers, shrimpers, and oystermen who utilize the estuary on a daily basis. The competency group met on a regular basis over a 6-month period to define the scope and priorities for the creation of a new nature-based defense model (Fig. 5.4). The effort culminated with the co-development of a Delft3D flexible mesh model that incorporates local knowledge and input from the local community on preferred nature-based defenses and criteria for evaluating the effectiveness of the tool for cultivating



**Fig. 5.4** Coastal protection and restoration projects designed and modeled by a competency group consisting of coastal residents and scientists. (Used with permission of The Water Institute of the Gulf)

coastal resilience in different geographic regions (Hemmerling et al. 2019). While the resultant model may bear a superficial resemblance to other scientifically derived models used in efforts like Louisiana’s Coastal Master Plan, it is qualitatively different in that the model was co-designed to specifically address current and historical inequities identified by local resource users and residents. By bridging the information gap between local and technical knowledge experts, the competency group process provides a mechanism to bring issues of social justice to the foreground of the planning process.

## 5.7 Conclusion

Ultimately, for coastal protection and restoration to proceed in a socially just manner, the coastal planning process will need to strike an effective balance between science-driven processes and engagement with residents and stakeholder groups who are especially vulnerable to risk as well as those who are likely to be affected by policy actions. A central goal of restoration and protection planning should

therefore be to create and sustain a process that is just, transparent, and accountable to those affected by its actions (Olsen et al. 2006). Many coastal residents feel that their local knowledge is not ultimately accounted for in the coastal restoration planning process, even within their own communities, and that new, meaningful, and actionable ways of accounting for and integrating community input into the management, planning, and decision-making process were seen as necessary to increase local support of restoration projects (Carruthers et al. 2017). It is not enough to simply introduce participation into a system that has historically been considered unfair or biased (Larson and Ribot 2007). To be both effective and sustainable, coastal management programs must be supported by the generation and incorporation of reliable knowledge that allows affected stakeholders and the project management teams to better understand and anticipate the consequences of different courses of action. This knowledge should be drawn from both the scientific community and from the observations and local knowledge of community members who reside and work in the systems of which they are a part. The participation of local knowledge experts in the planning process can provide insight into social, ethical, and political values that cannot be gained through scientific approaches alone and allows coastal planners to generate more alternatives, resulting in flexible actions and mutual benefits (Stringer et al. 2006; Zedler 2017). Such a participatory process should create opportunities for coastal planners and project managers, residents, and key stakeholders to assess project outcomes through every step of the process. To begin to ameliorate social justice issues, engagement needs to involve residents as full partners in the process. If their voices are heard but do not impact the process, then the process will fail to even begin to address deep-seated justice issues. By incorporating data derived from two-way dialogue with local knowledge experts into the coastal planning process, coastal managers will be able to more effectively adapt to local needs and changing circumstances, particularly when knowledge is transferred horizontally between stakeholder groups and vertically to higher institutional levels (Zedler 2017). It may be this institutional acceptance of the validity of local knowledge as an important data source, one on par with technical scientific knowledge, determines the ability of local residents to effectively influence the protection and restoration process. Ultimately, if the results of the engagement process are not used by coastal planners, then the engagement effort will be to no avail because it will fail to contribute to a better and more just coastal restoration.

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