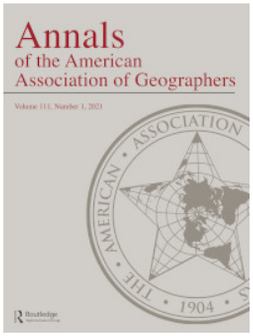

Annals of the American Association of Geographers

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/raag21

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To cite this article: Monica Patrice Barra (2021) Good Sediment: Race and Restoration in Coastal Louisiana, Annals of the American Association of Geographers, 111:1, 266-282, DOI: 10.1080/24694452.2020.1766411

To link to this article: https://doi.org/10.1080/24694452.2020.1766411

Good Sediment: Race and Restoration in Coastal Louisiana

Monica Patrice Barra

School of the Earth, Ocean & Environment and Department of Anthropology, University of South Carolina

Building on a small, yet growing body of scholarship focused on the political ecology of race and critical race studies of science and technology, this article follows the ways sediment, science, and race intersect on the grounds of environmental restoration in coastal Louisiana. Mobilizing ethnographic field work and historical research conducted with African-American communities and coastal scientists, I empirically expand upon geographer Kathryn Yusoff's (2018) notion of the "geosocial registers" of the Anthropocene through an examination of the entwined histories of coastal engineering and racial inequality that situate contemporary debates about large scale coastal restoration projects along Louisiana's disappearing coastline. In dialogue with critical work on the relationship between racism, science, and the constitution of the Anthropocene, I argue that coastal restoration is a geophysical and social process upon which racial inequality is forged and contested. The article concludes by considering how environmental restoration can participate in creating alternative forms of social and environmental repair by aligning the goals of coastal science with those of racial justice for communities of color living in changing coastal landscapes. *Key Words: coastal restoration, critical race STS, geology, political ecology of race, sediment.*

> The Mid-Barataria Sediment Diversion may very well be the most important environmental construction project in the history of our country.
>
> —Executive Director, Coalition to Restore Coastal Louisiana

> I understand that we have good sediment, but will your diversion do justice for our community?
>
> —Resident, Plaquemines Parish, Louisiana

It is a late February afternoon and the pews of St. Paul's Baptist Church in Ironton, Louisiana, are full. Residents are gathered in the small church for a meeting with the Louisiana Coastal Protection and Restoration Authority (CPRA), to discuss the construction of the Mid-Barataria Sediment Diversion, a large-scale environmental restoration project that will reroute 75,000 cubic feet per second (cfs) of the Mississippi River into disintegrating coastal marshes one mile north of the five-block-long African American community. The Mid-Barataria Sediment Diversion—colloquially referred to simply as "the diversion"—is the largest and most controversial piece of Louisiana's Master Plan to protect coastal areas from increased risks of coastal flooding due to unprecedented rates of wetland loss. The diversion, long in the works at the state level, recently began its bid for a permit from the U.S. Army Corps of Engineers to make a cut in the twenty-three-foot high river levee next to Ironton and begin construction. The goal of the project is to use the sediment-rich waters of the Mississippi River to rebuild sinking marshland to the west of Ironton, which sits approximately forty miles downriver (southeast) of New Orleans in Plaquemines Parish (county), Louisiana.

Along with other coastal communities, Ironton is on the edge of Louisiana's "losing a football field per hour" land loss crisis (Couvillion et al. 2011, 1). The significant amount of coastal wetland loss throughout the Louisiana coast over the past century exposes numerous low-lying bayou communities to unprecedented flood risk associated with tropical storms and hurricanes. In places like Ironton that are outside the federal storm surge protection levees,[1] projections of future storm surge heights are over fourteen feet (CPRA 2017), well above the

Annals of the American Association of Geographers, 111(1) 2021, pp. 266–282
Initial submission, August 2019; revised submission, March 2020; final acceptance, March 2020
Published by Taylor & Francis, LLC.

average height of many of the one-story houses and mobile homes in Plaquemines Parish.

Although the risks associated with losing land are shared among communities across the coast, Ironton is also bracing for the uncertain impacts of the diversion. The prospect of being an "ideal area" for harvesting sediment alarms the diversion's neighbors for several reasons. The most immediate concern is the impact of the freshwater from the Mississippi River on the salinity levels in the estuaries that support the region's commercial fisheries (Peyronnin et al. 2017). Neighboring residents are also concerned that, at 75,000 cfs, sediment diversions will put several feet of additional water into local wetlands. Increased water heights can mean that tropical storms, strong winds, or other unforeseeable weather events can push even more water from the marsh into their communities.

Peppered by questions derived from these concerns, CPRA officials did their best to explain what sediment diversions are and how they will help restore the coast. "Our goal is to have the most amount of sediment with the least amount of water," one official from CPRA said as he clicked through diagrams of the structure on a projector screen set up at the pulpit.

After a tense back and forth among the audience and presenters about the specifics of flood insurance, levee heights, the amount of sediment in the river, and basics of delta geomorphology, Ms. Shannel[2] stepped up to the pulpit. She did her best to articulate the global concerns of residents from Ironton and several of the other small communities of color in the pathway of the most ambitious environmental restoration project ever attempted in the United States:

> We understand that the scientists say [Ironton] is an ideal area. But someone needs to say, a mile south is a community. We need some humanity. … Why us? Why always us? Everything negative is next to a black community. Sediment is not bad but we're hoping someone can be an advocate for us.

Her comments drew silence from the men at the projector screen as the orange sunset radiated multicolored light through the church's stained-glass windows.

"I understand," Ms. Shannel went on to say, emphasizing her points, "that we have good sediment … but will your diversion do *justice* for our community?"

The question drew vocal affirmations from several residents in the church along with enthusiastic head nods. CPRA officials were prepared to answer questions about sediment and delta geomorphology but not about what, if any, connection coastal restoration has with achieving justice, or with experiences of injustice, for a historic African American community in the path of their ambitious experiment.

Race and Coastal Restoration

In an effort to unpack the relationship between racial injustice and coastal restoration implicated in Ms. Shannel's questions, this article follows the ways in which sediment, science, and race intersect with environmental restoration in coastal Louisiana. Attending to what geographer Kathryn Yusoff (2018, 13) describes as the "geosocial registers" of the geologic sciences—the social conditions and consequences of geologic thinking—this article analyzes the relationship between race and geology through a close examination of the connections between racial histories and scientific understandings of delta geomorphology that inform debates about coastal restoration. I call these the geosocial histories of coastal restoration. Drawing on ethnographic and historical research conducted with African American communities and coastal scientists, I show how sediment and science take on different meanings for these seemingly disparate groups drawn together by coastal restoration. I do this by attending to the diverse geosocial histories communities of color and coastal scientists ascribe to river sediment diversions as they emerge through ongoing and historic connections between coastal science, engineering, and racism in southeast Louisiana.

Theoretically, this article is situated within scholarship interested in political ecologies of race, black geographies, and critical analyses of racism and science, especially as they are enacted in the constitution of the Anthropocene. As an example of "grounding the Anthropocene" (B. Braun et al. 2015), this article augments these bodies of scholarship by examining how ideas about geophysical processes emanating from coastal science reproduce racial inequalities in climate changed environments.

Empirically, this research builds on scholarship in geography that examines the coastal environment as a means through which regional racial formations

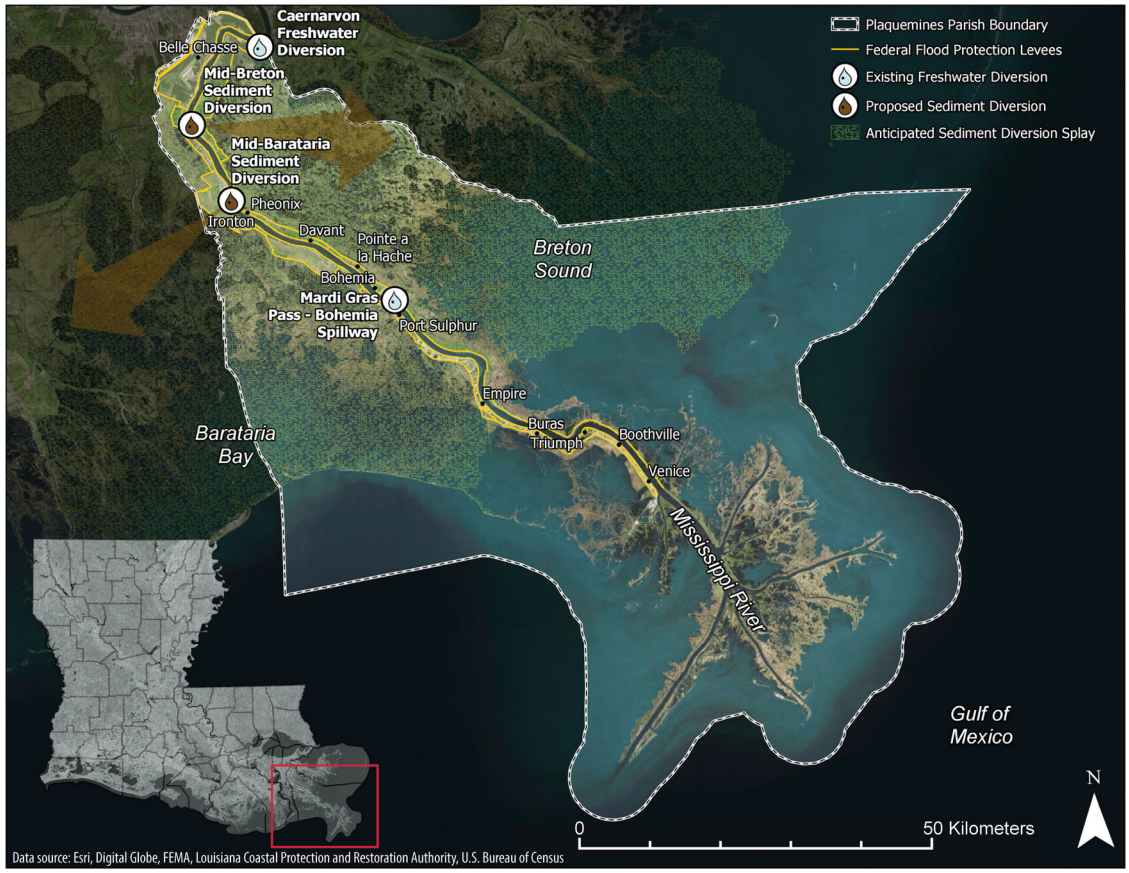

Figure 1. Map of Plaquemines Parish listing several of the towns referenced in this article and the location of existing freshwater diversions and proposed river sediment diversion projects. Map created by Harris Bienn (2018).

are forged, particularly for African American communities in the U.S. coastal south (Finewood 2012; Kahrl 2012; Hardy, Milligan, and Heynen 2017). In conversation with these works, this article argues that seemingly colorblind coastal science and notions of good sediment are as much enrolled in the practice of earth making (environmental restoration) as they are in the practice of race making (racial formation). In this regard, I analyze coastal restoration as a geophysical and social process on which racial inequality is forged and contested. This article concludes by considering how restoration, as an act of land and race making, can become positioned with alternative forms of social and environmental repair by aligning the goals of coastal science with those of racial justice for communities of color living in changing coastal landscapes.

Materials and Methods

This article draws on a portion of eighteen months of ethnographic research (participant observation) I conducted between 2015 and 2018 that examines the racial politics of coastal restoration science for African American[3] communities living along the lower Mississippi River in southeast Louisiana. Participant observation for this project consisted of weekly interactions with scientists (geologists, engineers, ecologists) working on various aspects of coastal restoration research and residents from several African American communities in Plaquemines Parish (Figure 1) where sediment diversions will be built. In addition to participant observation among both groups, I conducted thirty-five semistructured interviews and oral histories with participants to dig deeper into the specifics of community histories in Plaquemines Parish, the history of coastal restoration science, and the politics of sediment diversions. This article analyzes this collection of interviews and ethnographic fieldnotes with attention to the following themes and questions: (1) the impacts of past river engineering projects, for flood control or restoration, on African American and mixed-race communities in Plaquemines Parish; (2)

how scientists whose work informs the current development of sediment diversions understand the social impacts of their research, specifically on African American communities; and (3) to what extent African American residents living adjacent to sediment diversions understand coastal restoration science as a mechanism through which racial inequalities will be sustained. I also consulted secondary and primary source material on the history of Plaquemines Parish, specifically its African American communities, and histories of the U.S. Army Corps of Engineers (the Corps) in the lower Mississippi River and coastal restoration in Louisiana. I used these works to identify key shifts in scientific ideologies and to contextualize the historic events described in my interviews and ethnographic research.

Together, these materials allowed me to reconstruct a narrative of coastal restoration that highlights the entwined histories of regional racial formations and coastal science in southeast Louisiana. More broadly, they enabled me to empirically ground the theoretical relationship between race and geology, demonstrating how ideological distinctions between human and nonhuman worlds are critical axes of power through which racial difference and inequality are forged.

Political Ecologies of Race, Science, and the Anthropocene

My research on racial formations and coastal restoration is informed by three primary theoretical fields: political ecology, black geographies, and science and technology studies (STS). Scholarship in these fields is rooted in distinct disciplinary histories that result in scant transactions between them, yet each offers important theoretical frameworks to examine how processes of racialization, geographic practices, and scientific knowledge come together. Setting these bodies of scholarship in dialogue provides a multi-disciplinary theoretical framework for analyzing contemporary forms of racism as itemerges from the seemingly apolitical space of science and geologic processes.

Political ecologists' analyses of environmental issues have historically privileged the lens of political economy to analyze how social inequities are co-constituted with the production of nature. A critical focus on race, however, constitutes only a small collection of work in the field (Finewood 2012). Urban political ecology has done a better job of engaging race as a framework of analysis for understanding uneven development of land use, real estate and development practices, park use, and green projects in urban areas (Heynen 2006; Byrne and Wolch 2009; Checker 2011), yet this is not characteristic of the field of political ecology. In fact, it reproduces the notion that race is only geographically an "urban" phenomenon. Feminist political ecology likewise struggles to consistently examine the ways in which racial ideologies, alongside gender, shape environmental struggles (Mollett and Faria 2013).

There is, however, a growing body of writing within political ecology, particularly emanating from North America, focused on the ways in which "race and nature work as instruments of power" (D. S. Moore, Kosek, and Pandian 2003, 8) to render narrow visions of nature and racial hierarchies as *natural* or common sense. This work builds on critical environmental histories of encounters between settler colonists, their descendants, and people of color that demonstrate the ways in which racial ideologies are enacted through settler colonial imaginaries of the environment as property, wilderness, and natural resources (Cronon 1983). From the dispossession of indigenous rights and land to create parts of the U.S. National Parks and forestry systems (Spence 1999; Kosek 2006) to the predatory real estate practices that evict African American communities from areas prime for coastal development and environmental protection (Finewood 2012; Kahrl 2012; Hardy, Milligan, and Heynen 2017), ideologies of nature are historically influenced by ideologies of racial purity central to the production of an imagined (white) U.S. identity (Cosgrove 1995) and its attendant structural inequalities. Across historical time frames and geographies, this literature demonstrates that racism and settler colonial ideologies of nature collide, destroying ecosystems and entrenching racial hierarchies.

These political ecologies of race complement work in environmental justice and black geographies that examines the role the environment and geography play in constituting forms of racism. Critical environmental justice scholarship has long shown how the unequal distribution of environmental risks or itinerant enforcement of environmental protections have constituted contemporary forms of racism and white supremacy (Bullard 1990; Pulido 2000, 2015). Importantly, this work also shows how

antiracist political mobilization is animated by alternative ideologies of the environment rooted in political liberation and civil rights (Checker 2005; Sze 2006), reflecting the fact that racialized communities understand the environment as a central mechanism through which forms of racism are not only forged but contested. Work in black geographies similarly interrogates the ways in which racism and modes of resistance enacted by black communities operate geographically across time, from nineteenth-century plantations to the flooded streets of post–Hurricane Katrina New Orleans (Woods 1998; McKittrick and Woods 2007; Bledsoe, Eaves, and Williams 2017). This encompasses examining how people of color mobilize the landscapes of plantations, maroon communities, and community gardens to create fugitive geographies: modes of inhabiting place outside the forces of antiblack racism (Wynter 1971; Stewart 1991; Trouillot 1998; White 2018; Wright 2019).

Foregrounding the relationship of race to geography and environmental change is crucial for understanding the political conditions that situate the emergence of the Anthropocene and its unequal impacts on historically marginalized people of color (Chakrabarty 2009, 2014; Heynen 2016; J. W. Moore 2017; Whyte 2017). This is particularly important for communities of color in the U.S. coastal south living in rapidly changing environments who are more readily known for becoming "climate refugees" (Davenport and Robertson 2016) in popular culture than as historically marginalized groups fighting against state-sanctioned forms of racism. As geographers and anthropologists working with several of these communities note, divorcing histories of colonialism and structural inequality from public understandings of climate change runs the risk of reproducing racial inequalities under the guises of climate adaptation change policies (Hardy, Milligan, and Heynen 2017; Maldonado 2018; Marino 2018; Jessee 2020). Broadly depicting the Anthropocene as a solely geological event similarly runs the risk of disregarding the ways in which racial, classed, and other forms of difference are implicated within the global and temporal shift into the Anthropocene.

As critical human geographers and others note, however, the Anthropocene cannot be easily disentangled from its social dimensions. Yusoff (2018) provocatively underscored this point through a careful excavation of the "geosocial" histories of the natural sciences (specifically geology) and their relationship to the normalization of racial hierarchies from the colonial period to the present. In her recent work *A Billion Black Anthropocenes or None*, Yusoff (2018) examines the designations of life and nonlife established by the field of geology in the eighteenth and nineteenth centuries as a means of conceptually separating the world of rocks and humans, objects and subjects, that reinforced the racist ideologies of the colonial period. Geologic thinking, she argues, laid the foundation for racial thinking upon which climate change inequalities in the Anthropocene are constituted. In dialogue with critical scholarship on the Anthropocene and work in black geographies, Yusoff's "prehistory" of the Anthropocene argues that it was not only slavery and ideological beliefs about innate biological difference among peoples from Africa and other non-European countries that normalized a social world defined by racial hierarchies. Rather, it was the "language of geology itself" that also worked to fashion a "division between life and nonlife" that rendered distinctions between humans (owners) and "subjects priced as flesh (or inhuman matter)" as conceptually, and thus morally and politically, possible (Yusoff 2018, 9). This "alchemy of slavery [or racism] and geology" (ibid.) that rendered black life inhuman was foundational to the colonial world order. In other words, geologic thinking enabled black bodies to be cast within the realm of rocks, soils, and sediment (i.e., natural resources). This makes geology complicit with forms of biopolitical rule and rationality (B. Braun 2000) that naturalize the racial hierarchies that "sediment the settler colonial state" at a "lower resolution" than other forms of statecraft (Yusoff 2018, 81).

Distinctions between science and society fashioned by the natural sciences manifest today in the incapacity (or unwillingness) of scientists and critical scholars of science to directly examine the relationship between institutional racism and science. This is particularly disconcerting for scholars of STS, who have systematically "black boxed" race, racism, and white supremacy within the critical study of science and technological innovation (Mascarenhas 2018). To be sure, STS scholars have long considered the coproduction of scientific knowledge, social life, and, more specifically, power (Jasanoff 2004). Yet in our critical empirical examinations of the conditions and consequences of knowledge production, its

relationship to race and racialization is largely overlooked. As Mascarenhas (2018) notes, neglecting to make race an important framework of analysis in STS ignores the complicated ways in which "science and technology continue to direct the processes by which racial categories are reasoned, crafted, and legitimized" (163–64; see also Benjamin 2016). Although research on racism and the biomedical sciences present an important exception to this critique,[4] analytic frameworks in STS that foreground race are rarely used. Not attending to race in our analyses of science reinforces the logics of the settler colonial state (cf. Yusoff 2018) that normalize science as colorblind and ideologically bolsters its unmarked privilege to delimit the boundaries between life and nonlife/human and nonhuman—one of the central mechanism through which racism is produced.

Coastal Louisiana inherits the entwined histories of race, science, and geologic change most strikingly today in its environmental struggles, particularly coastal land loss and restoration.

Framed by these critical perspectives to analyze geology and race together, the remainder of this article draws on my research in Louisiana to excavate the geosocial histories of coastal restoration. First, I briefly describe scientific understandings of delta geomorphology and how sediment became the defining feature of coastal restoration science over the course of the twentieth century. From here, I trace the connections between racism and the history of coastal science as they are remembered and debated by the communities of color in Plaquemines. To specify these connections, I focus on the scientific and political contexts that situate key moments in coastal engineering that are the geosocial analogues to contemporary beliefs (and debates) about sediment diversions. Against this backdrop, I demonstrate the ways in which these geosocial histories shape contemporary struggles over the meaning of coastal science and restoration projects from the perspectives of scientists and residents and the wider theoretical conversations implicated in these struggles.

The Geology of Good Sediment

> That sediment is going to be our salvation.
>
> —CPRA Chairman, 2013

The "big muddy," as the Mississippi River is fondly described in popular culture, is a casual description of the millions of tons of sediment suspended in the river, which drains over a third of continental North America from its headwaters in Minnesota to its end in Louisiana at the Birdsfoot Delta in the Gulf of Mexico. Unencumbered by infrastructures for flood control like levees, the main channel of the Mississippi River periodically overflows its banks, enriching soils alongside the main channel with alluvial deposits that make the lands adjacent to the river prime areas for agricultural development. As the river gets closer to the Gulf of Mexico, it begins to widen out across the low, flat coastal plain, continuously distributing sediment in fan-like deposits that gradually accrete into land. Over the past 7,000 years in Louisiana, these geophysical processes have led to the formation of several deltas (or delta lobes) as the river has moved back and forth across the coastal plain building what is now called south Louisiana (Roberts 1996; Paola et al. 2011).

Although deltas like the Mississippi River Delta are constantly sinking (subsiding) under the weight of new sediments, if they maintain a consistent supply of sediment they continue to prograde (or grow) at the mouth of the current river channel, offsetting rates of subsidence (Paola et al. 2011). Since the late nineteenth century, however, the construction of levees, floodwalls, and dams along the lower Mississippi River aimed at reducing flood risk and keeping the Mississippi River from changing course have severed the land-building relationship between the river and the coastal wetlands, allowing subsidence to outpace accretion (Gagliano, Meyer-Arendt, and Wicker 1981; Day et al. 2007). The search for oil and gas since the early twentieth century has also contributed to the rapid degradation of fragile coastal wetlands through the construction of access canals, pipeline laying, and well digging, which have facilitated the intrusion of saltwater into freshwater marshes (Turner 1997; Priest and Theriot 2009). Combined, these activities have brought coastal wetlands to a state where they are starved of sediment and drowning in saltwater.

This story of interrupted delta geomorphological processes is the reason representatives from CPRA at the church in Ironton and the coastal scientists they work with look to sediment as the central focus of coastal land restoration practices. Sediment and delta geomorphology constitute the ideological infrastructure of Louisiana's "50 year, $50 billion dollar" Coastal Master Plan that, although politically

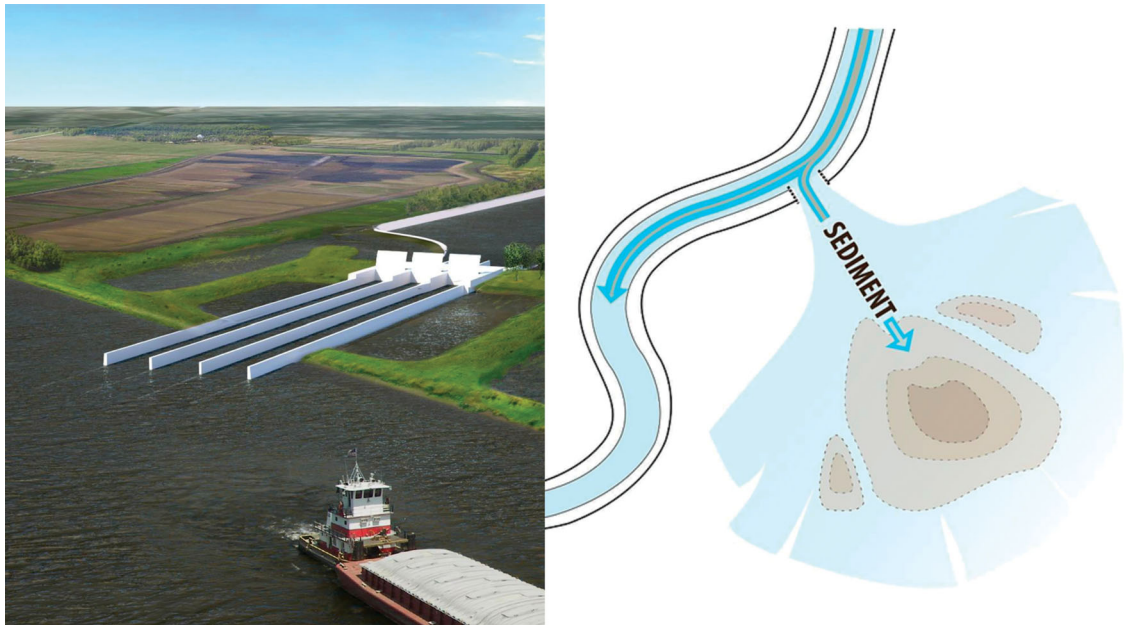

Figure 2. Sediment diversion structure conceptual design circulated by CPRA. *Source*: Coalition to Restore Coastal Louisiana (n.d.).

pitched as a cost-saving measure that aims to prevent "$100–$220 billion in direct asset damages" (Peyronnin et al. 2013, 13), aims to slow rates of land loss (CPRA 2017). As the quote from the chairman of CPRA at the opening of this section indicates many policymakers and scientists hope, sediment is going to be coastal Louisiana's "salvation."

The chairman's comments focused on sediment because the most geologically ambitious and politically controversial aspects of the Master Plan involve the construction of several river sediment diversions along the lower reaches of the Mississippi River south of New Orleans in Plaquemines and St. Bernard Parishes. Designed to "capture and divert sediment from the river and deposit it into the basins, restoring the river's natural process and building and sustaining land' (CPRA n.d.), diversions propose to restore natural processes by creating several controlled breeches in the federal levee system that was designed to protect communities from riverine flooding (Figure 2). The idea of using the river for wetland restoration first emerged in the mid-twentieth century when local scientists and the Corps noticed that the coastline was retreating at a rate outpacing the capacity of the river to accrete new land (Morgan and Larimore 1957; Gagliano, Kwon, and van Beek 1970). Yet it was not until several decades later that state and federal agencies began investing substantial money into scientific research on tactics to slow, and possibly reverse, land loss (Theriot 2014; Colten 2017). Moderate investments in restoration trickled in for projects in the 1990s, but they were not widely embraced until the years following Hurricanes Katrina and Rita in 2005. In the wake of the hurricanes' devastation, national attention to Louisiana's environmental vulnerabilities redoubled the efforts of scientists and policy makers to take bolder steps toward larger scale restoration initiatives (Day et al. 2007), and sediment diversions fit the bill.

Geosocial Histories of Plaquemines Parish

To understand where Ms. Shannel's questions about racial injustice came from at that meeting about sediment diversions, we have to understand the histories that people like Ms. Shannel carry with them and pass on about the ways in which black bodies and communities are connected to reworking the lower delta landscape and the role that scientific knowledge has played in constituting these connections.

As with many bayou communities, the relationship of African American communities in Plaquemines Parish with the Mississippi River, coastal wetlands, and science is dynamic and shaped

by histories of racism. Ironton is one of several small hamlets—including a marsh-front retiree community and an indigenous community accessible only by boat—neighboring the proposed Mid-Barataria Sediment Diversion project. Many of the current residents, although not all, trace their ancestors back to enslaved plantation laborers and white plantation owners in the region when it was dominated by sugar plantations (Follett 2005). This was a topic that came up early on in my conversations with Ms. Irvine, who showed me a picture of the old overseer's house she and her cousins played in as small children. Ms. Irvine is an elder in the Ironton community who grew up about fifteen minutes down the road from Ironton near Magnolia, which used to be home to one of the largest sugar refining mills in the area during the mid-nineteenth century. When Ironton and Magnolia were sugar plantations, slaves were tasked with the agricultural and industrial labor of cultivating sugar as well as constructing some of the first levee structures in the region long before the Corps was tasked with managing regional flood protection (Barry 1997; W. Johnson 2013). Following emancipation, former slaves and their descendants were able to grasp a piece of independence and autonomy as they continued to work as wage laborers on plantations turned orange groves and truck farms into the twentieth century (Ware 2012). In some cases, black families were able to buy pieces of former plantation sites from larger landowners with whom they had built amicable relationships. Owning land enabled them to supplement income by growing their own fruits and vegetables. In addition to this, vast tracts of forested wetlands were used for hunting and fur trapping, shallow saltwater marshes supplied abundant seafood, and the freshwaters of the Mississippi River provided venues for drinking, baptisms, and recreation. This was done amid the racism of Jim Crow segregation that systemically dispossessed African American and other communities of color from political power and access to public resources (Jeansonne 1977; Isaacson 1978; Edwards 2017). Elders in Ironton share these histories with numerous other African American communities that established families and communities on former plantation lands in the lower river region (Jackson 2006; Ware 2012; Browne 2015).

Although the coastal landscape was often used by black communities as a source of sustaining black life and livelihoods, these practices were forged against the imposing backdrop of Jim Crow racism through which the evolution of engineering the lower delta landscape also unfolded. This is perhaps best captured in the words of LeRoy Percy, a prominent Mississippi cotton plantation owner, in a letter he sent to a friend in 1922 describing race relations in the region: "Nothing," he wrote, "could be more interesting, so far as racial study goes, than to see five or six thousand free [African Americans] working on a weak point [in the levee] under ten or twelve white men [done] out of a traditional obedience to the white man" (quoted in Barry 1997, 193). Reflecting the predominant views of race relations held by white landowners at the time, Percy's words were put to paper when the Corps was approximately forty years into the Herculean task of establishing a systemic network of flood control infrastructures that would be able to protect communities along the lower third of the Mississippi River from catastrophic riverine flooding. To repair, standardize, and maintain hundreds of miles of levees along the Mississippi River, the Corps relied heavily on the low-wage, or at times forced, labor of immigrants, prisoners, and black workers (Lomax 1993; Barry 1997; Woods 1998). Coercion and threats of violence to acquire workers to raise the levees were not uncommon, especially during times of crisis like the Great Flood of 1927 (Barry 1997). The mobilization of science and engineering to take control over the river meant the capacity to reclaim land and sustain the "socioeconomic order" of the region (Reuss 2004, 46). In other words, the science of the modern Mississippi River flood control system historically "embeds and [was] embedded within" (Jasanoff 2004, 3) the terrain of racialized social hierarchies.

The confluence of Jim Crow and evolving riverine and coastal science converged in Plaquemines Parish in the early twentieth century as the Corps experimented with the construction of the Bohemia Spillway, the first of several spillways (also called floodways) established on the lower east bank of the Mississippi River. Ms. Lynda, who was in her mid-eighties when I first started visiting with her in late 2016, grew up with stories of the Bohemia Spillway shared among family members. She recalled the bitter forced migration from the remote settlements in the marshes near Bohemia to accommodate the Corps' first foray into using spillways for flood control. Located southeast of New Orleans toward the

Birdsfoot Delta on the east bank of the Mississippi River, the Bohemia Spillway was completed in 1926 as a flood control mechanism that could, in theory, relieve pressure on levees upriver during times of high water. The Bohemia Spillway was framed by scientists as an engineering necessity that could settle outstanding debates among engineers about whether or not a "levees only" or "levees and outlets" approach should dictate the direction of riverine engineering and science (Barry 1997; Reuss 2004). Controlling the river was a pressing concern for development and economic investments in the region's urban centers built around the Mississippi River's current channel and to keep the river from flooding New Orleans, the region's commercial center.

At the time, several small black and immigrant communities were living on the land that would become the Bohemia Spillway, including Ms. Lynda's grandparents. According to local newspapers in 1926, landowners were fully financially compensated for the transfer of their lands to the Orleans Levee board (who owned and maintained the spillway). When the terms of property transfer were reexamined in legal cases in the 1980s by the descendants of former landowners, it was found that many of the purchases happened under "threat of expropriation"—or at gunpoint, as several residents who had grandparents evicted from Bohemia Spillway land like Ms. Lynda told me. They left because they felt it was the only way they could protect the safety of their families, Ms. Lynda explained. The engineering experiment, it was revealed once communities left, was also located on more than $43 million worth of oil and gas revenues as of the 1980s (Marcus 1986).

The Bohemia Spillway does not get as much historical attention as other events do, such as the dynamiting of the Mississippi River levee upriver from Bohemia at Poydras during the 1927 flood (Barry 1997). On the east bank of Plaquemines Parish, though, Bohemia looms large in collective memory as an example of how science (and engineering) has historically been mobilized to dispossess black communities of land and wealth. Ms. Carmen, who lives just a mile or so up the road from the Bohemia Spillway site today, elaborated her perspective to me one afternoon as we discussed the history. "They wanted the oil, not a spillway," she said, as we stood on her porch looking over freight traffic passing on the Mississippi River. "The spillway was just an excuse. Why would you put a spillway in the natural spillway of the delta?" she said, casting a sideways look my way to indicate how ridiculous the scientific argument was to her. Ms. Carmen's critique of the geological sense of the spillway is echoed in court documents concerning royalties from subsurface minerals in the spillway and the questionable terms on which the land was expropriated. The fact that the spillway was better at generating revenue from oil and gas deposits than preventing catastrophic floods upriver indicated that it was predominately a land grab masquerading as geophysical necessity.

Lands where subsequent spillways were established in the years after the Bohemia experiment followed a similar course: cutting through poorer communities of color on the basis of where the river should go according to the logics of delta geomorphology and engineering. This established a pattern within the context of the societal and political dynamics of Jim Crow segregation wherein spillways could move from experiments to standards for flood control on the grounds of black and poor communities. The Bonnet Carré Spillway above New Orleans opened in 1932 (Scallan 2012; Deveraux 2014) and the Morganza Floodway above Baton Rouge opened in 1954 (Cheramie and Pasquier 2013) and were routed through family lands, churches, and graveyards, with many of the displaced residents and land belonging to the descendants of formerly enslaved Africans. Whereas more politically powerful white landowners in the upper delta region were able to fight against having their lands turned into spillways (Reonas 2009), poorer landowners and African American communities saw their lands increasingly become spillway sacrifice zones that, although scientifically designed to accommodate the river, carved the prevailing racial hierarchies further into the landscape.

Many of the individuals who grew up with these stories recounted by parents and grandparents similarly found themselves in the crosshairs of new environmental protection measures in the mid- to late twentieth century as coastal scientists began mapping the steady retreat of Louisiana's coastline and outlining possible strategies for protecting a changing coastal environment. When, for example, the Louisiana Department of Wildlife and Fisheries passed a regulation outlawing the use of hand dredges for oystering in the late 1970s, many of the

Figure 3. Mural honoring the political work of local oystermen on the east bank of Plaquemines Parish. Photo by author.

black oystermen living in Plaquemines Parish saw this as a case of blatant racial discrimination operating under the guises of environmental protection. As Dale, one of the oystermen who challenged this regulation in court, recounted, the regulation was passed at a time when black oystermen were finding ways to stop working as low-wage laborers on the bigger oyster operations predominately owned by Croatian oystermen (Ware 1996, 2012; Edwards 2017). Gary, another local oysterman, described the experience as similar to the racism and environmental practices of the plantation. When oystermen like Dale and Gary began outfitting their own boats with small hand dredges to liberate themselves from low-wage jobs on the big boats, they quickly found themselves up against the arm of white supremacy in Plaquemines Parish, maintained in part by coastal science and policy. After the oystermen's lawyers argued in court that the law was racially discriminatory, the ban on hand dredges was overturned (Webre 1980).

While black oystermen were organizing against discriminatory practices on water and land across the parish (Figure 3), coastal scientists were busy grappling with the complexities of sediment, water, and land loss. Scientific findings from initial research on wetland loss and river diversions in the 1970s reflected that diverting the river at specific points could be used to maintain changing salinity regimes in local estuaries and potentially begin to stem the bleeding of coastal lands through the creation of new subdeltas (Gagliano, Light, and Becker 1973; U.S. Army Corps of Engineers 1984). Although the idea of diversions was promising from the perspective of geomorphology, scientists and policymakers did not fully anticipate the social challenges that would accompany reconnecting the river to sinking wetlands as the diversion went from an idea to the construction of the state's first major restoration project.

When the Caernarvon Freshwater Diversion opened in 1991, tensions between coastal science and residents (particularly fishermen) from across the racial spectrum in Plaquemines Parish and nearby parishes flared up once again (Figure 1). Located on the east bank of the Mississippi River not far from the Bohemia Spillway, the Caernarvon Freshwater Diversion is a salinity control structure initially proposed by the Corps in the 1960s. Although it was not explicitly billed as a restoration project, an increasingly vocal cadre of scientists and environmentalists at the time were hoping that it would become a model for coastal land restoration (Theriot 2014). Salinity and other concerns were particularly pressing for black communities and oystermen who lived next to Breton Sound and relied on the local oyster beds for subsistence and economic independence from large, white-owned oyster companies in the parish.

Within its first few years of operation, the diversion caused widespread oyster mortality among the 8,200 leases in the outfall area (Caffey and Schexnayder 2002). As Dale, Gary, and other residents recounted to me during multiple oral history interviews, the opening of the diversion was devastating (see also Ware 2012). The Caernarvon Diversion poured 7,000 cfs into the estuary for several years until oystermen filed court cases against the Louisiana Department of Natural Resources in 1996 (McGuire 2006). Oystermen argued that the unanticipated scale of destruction constituted an "unlawful 'taking' of private property" (McGuire 2006, 699) in the form of water bottoms they leased. At first, the lower courts agreed with the oystermen, granting them almost $2 billion in damages. On appeal, though, pressure from environmental groups aimed at restoring sinking coastal wetlands began to shape public opinion about the ecological benefits of restoration. Against this backdrop, the Louisiana Supreme Court struck down the lower court's decision, arguing that although oystermen suffered significant damages, those damages were necessary "trade-offs" for the "greater good" of restoring deteriorating

wetlands (McGuire 2006, 701). The ruling created significant hardships for smaller scale oystering outfits, particularly black fishermen living in the area who lost the only oyster leases they had (Ware 2012).

Struggles over financial reparations for damages to oyster fishing grounds established a bitter relationship between oystermen and coastal restoration advocates over the use of the river's water and sediment to sustain sinking lands. These sour relations manifest today in heated debates between commercial fishermen, scientists, and policymakers over the construction of the Mid-Barataria Sediment Diversion, which, at 75,000 cfs, will move just under ten times more water than the Caernarvon Diversion into the estuaries surrounding the Mississippi River (CPRA 2017).

For African American communities in particular, these racialized geosocial histories of coastal science resonate with the multiple forms of land loss that black communities across the coastal U.S. South experience through the confluence of racism and the science and management of coastal environments (Jackson 2006; Kahrl 2012; Hardy, Milligan, and Heynen 2017). Firsthand and inherited experiences of loss and triumph on the grounds and waters of black communities in Plaquemines Parish are in large part why many coastal residents find sediment diversions to be anything but colorblind or politically neutral. Whether for the purposes of innovations in engineering or for restoring so-called "natural" geomorphological processes, proposals to reroute the river for wetland restoration register as déjà vu for the communities that continue to be put in the pathway of geologic experiments in thename of capturing good sediment.

The Contradictions of Doing Science That "Matters"

These histories of spillways, oystering, and restoration filled the silence that hung in the air at the church in Ironton as residents awaited the reply of the men from CPRA to Ms. Shannel's question about justice. Their silence reflects a way of thinking about coastal restoration through the logics of delta geomorphology, which they assume to be a formidable shield from politics, including racial politics. Yet it was clear from my time in communities throughout Plaquemines Parish that race and injustice were central to the history of engineering the river, whether for flood protection or coastal restoration. Compared to coastal policymakers like the men from CPRA, many of the scientists I worked with understood that sediment diversions were not entirely apolitical. The findings I derived from participant observation and interviews with residents helped me to frame conversations with scientists about sediment diversions and the complicated ways in which they see restoration as a geosocial project.

At work on boats or on foot in the river and marshes around Plaquemines, scientists have amicable, yet tense interactions with residents. Junior researchers like Jackie and Claudia, who forge into thigh-deep mud and marsh on a regular basis to collect sediment samples, were forewarned about the political climate around coastal restoration research in Plaquemines Parish. "Just try to avoid talking about diversions" was the advice they were given by senior scientists for fear that they might get dragged into a heated exchange with an irate fisherman in a remote fishing dock or bar room. As the lead researcher explained to me when I inquired about her advice to junior scientists to lay low in Plaquemines, residents think that their science is "the enemy."

To be sure, oystermen I knew from Pointe a la Hache (next to Bohemia) and other towns near proposed diversion sites were certainly suspicious of scientists, or at the very least concerned about scientists' motivations for conducting research in their backyards. They saw some of the scientists affiliated with local universities and environmentalist organizations as so desperate to build river diversions that they would even go so far as to descend into the parish under the cover of night and dig away at river levees with hand shovels just to reconnect the river to the wetlands. "[The scientists] know they have to come down here with a group," a retired oysterman and few of his friends told me as we discussed their encounters with scientists over the years. He laughed, indicating that he was only joking. A significant part of his and other oystermen's frustration with scientists was not so much about restoration science being the "enemy" but the self-righteousness that emboldens some scientists to turn their fishing village into an environmental experiment. Hubris, as a senior ecologist who has worked for decades on the ecosystem impacts of land loss noted candidly to me during an interview, has been a challenge for many coastal scientists to overcome.

For Jackie and Claudia, the notion of restoration as repair is part of how they are able to conceptually separate their work on sediment diversions from the polarizing public debates about its potential unequal impacts. To a certain extent, this is due to a lack of knowledge about the place and people living in the communities surrounding their field sites. Unintended or not, this renders communities like Ironton or Pointe a la Hache as "invisible" or "forgotten," adjectives that black residents use colloquially to describe their small towns and to critically indict the long history of racism in the parish that has sought to erase their communities (Edwards 2017). It also reflects a shared sentiment among many scientists that their research, compared to science in contexts not directly tied to policies like environmental restoration, "matters" because it is "making a difference." The mentality among scientists of "saving the coast" is bolstered by ideologies of natural processes emanating from delta geomorphology that affirm the apolitical nature of geology and its fundamental separation from the world of coastal politics. Because the river naturally builds wetlands, mimicking that process is perceived to be a question of geomorphology, not politics. Restoring the coast, in this regard, is objectively good for everyone. Yet at many of the public meetings about coastal restoration I attended where scientists and residents confront each other, community leaders frequently insisted that science is something that needs to be approached with integrity and, further, that scientists need to reflect critically on exactly for what or for whom they are saving the coast. The inability of many of the most vocal coastal scientists to take to heart thinking about restoration as something other than inherently environmentally and socially good exacerbates the feeling that many residents have that their communities will once again become sacrificed to accommodate the river.

The conceptual distance between residents' and scientists' frameworks for understanding the political stakes of coastal restoration bolsters the idea held among many scientists I worked with that restoration is only anecdotally connected to experiences of dispossession that break down along the lines of race. This reflects the distinct ambivalence of many coastal scientists about how to reconcile their scientific training—which sharply distinguishes human worlds from marsh, mud, and sediment—and the desire to conduct science that matters.

While I was discussing public debates over the Mid-Barataria Sediment Diversion with James, a coastal geomorphologist, he tried to make his conceptual framing clear to me. "Look," he said, "I conduct basic science … I'm a dyed in the wool observationist … my science does not tell you if you should build diversions. It just tells you what will happen *if* you build them." James reiterated this point to me several times over sandwiches and cold drinks during the long, hot days I was working as a field hand helping with his research. He also emphasized the point in various ways at public meetings, where he was frequently questioned by fellow scientists and residents about the reliability of the predictive models that use his data to analyze the projected environmental impacts of sediment diversions.

Despite insisting that "basic science" and politics occupy distinctly separate realms, James understands why people from marginalized communities next to the proposed sites might see diversions through the lens of injustice as opposed to "natural processes." Policymakers knew, he explained to me during one of our post-fieldwork chats, that they needed to avoid Ironton because it is a "historically disenfranchised community." Minority communities are regarded as obstacles to gaining the necessary state and federal permits to build the diversion structure, similar to the challenges policymakers might encounter if their project affects the breeding grounds of an endangered species or a federal anchorage point for ships on the Mississippi River. He compared the conundrum to midcentury urban renewal projects that routed federal interstates through the middle of black and poor communities instead of wealthier white communities in New Orleans and other cities. "There is no question," he emphasized, that when state and federal policymakers decided to put Interstate 10 in the middle of a black neighborhood in New Orleans, it was "done for racial reasons."

What is important to note about that comparison, however, is that it is often not until several decades after the production of these projects like midcentury urban renewal that their overt racism is acknowledged by scientists and the general public. When we critically examine the construction of the Bohemia Spillway and other riverine engineering projects, a similar pattern emerges: These infrastructural projects and scientific experiments were not

cast in racial terms, yet their legacies clearly indicate otherwise. Indicating that he finds this way of treating black communities to be highly problematic, when we switched back to environmental restoration infrastructures like sediment diversions his perspective shifted. "It can't be helped," he emphasized, if these communities just happen to be next to a rich source of sediment and at a good angle in the river for capturing it. "You can tell the community about all the studies you have conducted," he lamented, "but is that going to convince them that these projects are not being done for racial reasons?" he asked me rhetorically. "No," he firmly stated, "it's not."

Although James is reluctant to make a causal connection between racism and coastal science, he clearly understands that the production of basic science cannot easily separate itself from the social realm, particularly when it comes to questions about land (either lost or restored) and impacts to communities of color. In his subtle way, James echoed what residents from Plaquemines told me in their stories about coastal science projects: The maintenance of racial inequalities and restoration are not only difficult to disentangle but constitutive of one another.

Discussion and Conclusion: Toward Alternative Restorations

As I have attempted to illustrate from my research on race and restoration in coastal Louisiana, the evolution of engineering the lower delta landscape—from plantations to flood control and now climate change planning and restoration—relies in no small part on a social terrain contoured by racial hierarchies to develop the science of disciplining the dynamic deltaic environment. As such, they are evidence of the socio-environmental geography of white supremacy (Pulido 2015) as it works to normalize racial inequalities through the riverine and coastal sciences, even when science is ostensibly invested in the seemingly noble work of saving the coast. In this regard, sediment is not a neutral or natural entity but a terrain of struggle.

The intersecting evolution of racism, science, and the lower delta landscape reflects not only the history of the Mississippi Delta but the centrality of colonialism and racism to the formation of the Anthropocene. Whether it is industrialization, nuclear engineering, or other historic events that scientists associate with the beginning of the Anthropocene, many social scientists have fervently argued that racial and class hierarchies generated the social conditions key to the emergence of the geologic age of humans (E. Johnson et al. 2014; J. W. Moore 2017; Vergès 2017). A focus on nineteenth-century colonial plantations and their reliance on racialized social hierarchies and the destructive practices of mono-cropping (Haraway 2015) gives us the necessary social historical contexts to situate unprecedented global atmospheric and terrestrial transformations (Chakrabarty 2009; Yusoff 2013, 2018) and the crucial role that the geologic and engineering sciences have in the constitution of the Anthropocene.

A critical examination of the racial contexts through which sediment-driven coastal restoration in Louisiana unfolds illustrates how racial matters are not only geographic matters (cf. Gilmore 2002) but geologic matters that hinge on the movements of sediment, water, and geologic knowledge. The history of political organizing among fishermen and residents in Plaquemines to fight for access to land and water captures the complex ways in which the delta landscape is enmeshed with projects of racialized oppression and resistance to racism. As such, geology is cast as complicit with, if not a form of, institutional racism by maintaining racial inequalities. Even in the so-called postracial era of climate change and the Anthropocene, the materials and practices that constitute environmental restoration are entangled with racial histories that sustain and indeed sediment racial geographies and their futures (McKittrick 2013). These are not only metaphors but the geologic and embodied realities that communities of color across Louisiana's disappearing coastal landscape confront as scientists and policymakers move forward with plans for saving the coast.

I would like to conclude by taking us back to the church in Ironton where I started this article and Ms. Shannel's question: "Will your diversion do justice for our community?" Her words are not only an indication that sediment diversions run the risk of exacerbating and normalizing regional racial inequalities. They are also a proposal to reconsider what it means to do restorative, reparative work in coastal Louisiana. The language of "saving the coast" and "football fields per hour" makes land loss sound urgent and, although it is certainly a pressing environmental concern, this conceptualization of land loss does not leave space (or time) to address the racial histories and injustices that saturate everyday life for individuals like Ms. Shannel and

communities like Ironton. Yet these histories—layers of racism, landscape change, and science—are intimately sutured into the lower delta landscape and to contemporary approaches to coastal restoration in Louisiana.

Ms. Shannel's words are an affirmation of these histories and a demand for patience and critical reflection on the meaning of repair, and perhaps reparations, that narratives of environmental (and geologic) crisis ignore. They are also a challenge to scientists and policymakers to confront the values, political alliances, and interpretive frameworks they bring to their science (Jasanoff 2007). For African American, indigenous, and other minority communities living among sinking wetlands in Louisiana, this demands envisioning coastal lands and waters as sites for providing livelihoods and political autonomy alongside necessary environmental restoration. In this light, what can appear as staunch critiques leveraged at scientists and coastal policymakers can be interpreted as timely suggestions for imagining how restoration can be enrolled in the practice of repairing racial and economic inequities beyond a zero-sum game of winners and losers in Louisiana's coastal land loss crisis.

Acknowledgments

I thank colleagues in the Critical Ecologies Lab at the University of South Carolina for their valuable feedback on earlier versions of this article and the anonymous reviewers whose comments helped to sharpen the article's arguments. Finally, this article would not exist without the materials and conversations that residents from Plaquemines Parish and coastal scientists in Louisiana shared with me. I thank them for their kindness.

Funding

Research for this article was supported by a doctoral research grant from the Wenner Gren Foundation, a Monroe Fellowship from the New Orleans Center for the Gulf South at Tulane University, a Rebirth Grant from the Louisiana Endowment for the Humanities (sponsored by Louisiana Sea Grant), and a Dissertation Writing Fellowship from the Graduate Center, City University of New York.

ORCID

Monica Patrice Barra http://orcid.org/0000-0001-7183-9880

Notes

1. The Greater New Orleans Hurricane and Storm Surge Damage Reduction System is a series of infrastructures (levees, flood gates and walls, pumping systems) designed to protect the greater New Orleans area from damages associated with a "one in one hundred year" flood from storm surges associated with tropical systems and hurricanes.
2. All names are pseudonyms.
3. I use the terms African-American and black to denote the range of African-American, Creole, and mixed-race communities with whom I conducted this research. This reflects the most common racial terms used by participants.
4. See Benjamin (2013), L. Braun (2014), and Nelson (2016) for recent examples.

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MONICA PATRICE BARRA is an Assistant Professor in the School of the Earth, Ocean & Environment and Department of Anthropology and faculty affiliate of the African American Studies Program at the University of South Carolina, Columbia, SC 29208. E-mail: mbarra@seoe.sc.edu. Her research focuses on the ways in which racial inequalities and geographies are forged through scientific practices, racial histories, and transformations of rural and built environments.