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The Birth of River Science and Grassroots Greenwashing

To understand what Foucault called a discursive episteme, he said we must create “a history of the present” that disrupts the *truths* that have become part of the natural order of things. One quick example is Lisa Bloom’s book, *Gender on Ice*, which explores how masculine gender construction and visions of empire shaped and motivated North Pole expeditions. Such imaginaries behind the construction of the pioneer explorer led to more than riveting tales of survival. They led to identity formation and policy to support more of the same imaginaries. Discourses and the truths of things are heavily dependent on the institutional formations behind knowledge production and circulation. How we come to understand the relationship between the Mississippi River and Louisiana wetlands relies on the institutional formation that produced both cultural and scientific knowledge about the river and the Louisiana coast. Our valuation of the coast for its extracted resources is part of this discursive regime. But how did this regime come to be? What were the political forces that contested and shaped our understanding? What were the economic structures surrounding this knowledge? What shaped the science—and scientific questions—that produced authoritative knowledge about them?

Science and policy on the Mississippi River had radically transformed the river from a mudscape to a consequential waterway through nineteenth-century flood control and river management. Mud was sacrificed on behalf of a rising nation; and today’s river emerged from a modern understanding of what a river was intended to be. The largest river on the continent symbolized the strength and commercial potential of a nation. This vision of a commercial highway of water played out in contracts awarded to investigative teams. Levees were built, and the floods of 1927 followed. The response to the catastrophic floods was a congressionally approved infrastructural program that removed the river’s mud from public view and attempted to control the height and behavior of the river that spawned an ongoing regime of infrastructural support and reinvestments that continues today.

In a pure *dialectic* fashion, this hardening infrastructure led to dire effects on the fragile coastlines of Louisiana and in turn spurred intensive investigation of river physiology and its role in producing the delta's coastal wetlands. Early studies from LSU that produced this knowledge were supported by national oil interests and the US Army Corps of Engineers—two participants with agendas that often opposed one another—while also further damaging the state's wetlands. The research programs that studied river morphology and wetland construction were indebted to and directly subsidized by the petroleum industry, the petroleum-friendly Louisiana Geologic Survey, New Deal funding, and the Army Corps of Engineers, the latter needing institutional research assistance for its ongoing project of controlling the Mississippi River through mechanical engineering principles.

The legacy of petro-dollars in Louisiana has fundamentally shaped how the state articulates its strategy for wetland management and how Louisiana residents accept the existence of oil and gas as an economic benefactor and part of the natural order of things. This confounding dilemma took shape alongside knowledge of the river's importance in delta construction. Knowledge development accompanied a period of rapid coastal erosion that coincided with the discovery of oil and gas deposits beneath large salt domes in the marshes. In fact, LSU researchers collected the very field samples that expanded their understanding of delta construction while doing contract work for the petroleum industry to survey land parcels for fossil fuel development. As they coronated the river as the marsh's progenitor, they blamed levees for reducing sediment replenishment. This, perhaps unintentionally, provided political cover for oil and gas interests whose canals, pipelines, and drilling platforms were destroying marshlands hectare by hectare.

EARLY STUDY OF LANDFORMS: BERKELEY ON THE BAYOU

We start in the early days of the LSU Department of Geology, which was officially established in 1922 by Henry V. Howe's arrival from Stanford University.[1] Dr. Howe came with a mandate from Louisiana governor John M. Parker to build a department "to train Louisiana boys for the oil industry."[2] He was charged with rebuilding a minor department that had collapsed four years earlier, "leaving only scattered heaps of rocks, minerals and fossils." Known for his enthusiasm for the subject matter, Howe attracted several students and began to lay a new foundation for a department that would be intimately tied to the state's petroleum industry.[3] Soon after joining the faculty, Howe persuaded the administration to hire his colleague, Richard Russell, who received his PhD from the University of California, Berkeley, to help develop the field of physical geography at LSU. In September 1928, Russell arrived in Baton Rouge, where he and Howe together built a major program of geology and geography, establishing the Louisiana Department of Conservation, which combined geomorphological, archaeological, and botanical reports in a single bulletin. The bulletin provided a publication venue for many of the early studies of the Mississippi River Delta.[4] Much of their research on Louisiana landforms was tied to contracts with the petroleum industry to appraise property values and land titles.[5] Howe soon made two additional hires: B. C. Craft, to train students in petroleum engineering, and Fred Kniffen from UC Berkeley, who had a strong background in cultural geography, anthropology, and geomorphology. "From this strong academic nucleus, the departments of geology, geography-anthropology, and petroleum engineering were combined in 1931 to form the School of Geology with H. V. Howe as its director."[6] Kniffen bridged anthropology and human geography, which allowed him to work with Russell to create a methodology that considered the habitation patterns of prehistoric Amerindians in response to changing river patterns. They were able to date river patterns by uncovered Indigenous artifacts. Russell's physical approach and Kniffen's archaeological analysis were a natural fit.[7] One trip that involved a visit to Larto Lake in central Louisiana resulted in the theory that the lake had once been a former channel of the Mississippi River miles from its present location.[8] Russell accompanied Kniffen on four trips into the lower river delta. "In all, Kniffen visited 44 sites that included earthen mounds, shell mounds and middens, and natural beach deposits containing pottery. He sketched mounds and bore sites and collected artifacts from the surface of sites."[9] Kniffen found multiple sites with collections of pottery: Natchez, Tunica, Caddo, Bayou Cutler, Coles Creek, Deasonville, and Marksville. Russell used Kniffen's site survey and prehistoric chronology to date the subdeltas of the Mississippi River. In a 1939 paper, "Quaternary History of LA," they concluded that Bayou Teche, where no Native American habitation artifacts were found, was the oldest Mississippi River course.[10]

Russell was able to demonstrate that a subdelta identified by the LSU archaeologist James Ford was older than the current St. Bernard subdelta. Ford, a student of Kniffen, started the archaeology program at LSU in 1937. After receiving a BA from LSU in 1936, he remained a research archaeologist there until 1946. While working on his graduate degree at the University of Michigan, Ford organized a WPA program for Louisiana, which helped create excavation sites throughout and establish an outline of the ceramic chronology of the Lower Mississippi Valley, including the Tchefuncte culture and the late prehistoric Plaquemine Culture site in West Baton Rouge Parish.[11] WPA digs also oversaw the excavation of Bayougoula in Iberville Parish, which identified the villages of Bayougoula, Mugulasha, Acolapissa, and other tribes of the late seventeenth-century period of historic contact.[12] Ford developed a timeline for the Lower Mississippi Valley, resulting in the cultural sequence: Tchefuncte—Marksville—Troyville—Coles Creek—Plaquemine—Natchez/Caddoan.[13]

The work demonstrated to Russell that three of the Native American cultures in the lower delta were relatively recent. Russell matched this evidence with marine shells close to the surface at New Orleans and the sequence of channel positions to theorize that the deltas themselves were young. His research on the geology of Plaquemines and St. Bernard Parishes also helped verify the historical meandering pattern of the river that created the Louisiana delta. His classic 1936 paper, "The Physiography of the Lower Mississippi River," combined geomorphological, archaeological, and botanical reports. He pointed out that in addition to the active delta, a sequence of abandoned deltas was in varying stages of decay in coastal Louisiana. In other words, the delta was dynamic and in various stages of formation and erosion. A delta was either in the process of growth because of the active sedimentation or in the process of decline because of a changed meander channel that was subject to natural subsidence and the stress of coastal tides. The paper argued that the delta has dominant natural levees that form the high land. The gentle slopes of these natural levees lead away from the river to marshes, swamps, and open waters. Upstream, the floodplains have tributaries; downstream, the deltas have distributaries and abandoned channels. "Meanders are present only on the floodplains where the channels encounter material deposited during the same cycle of alluviation and where the banks are lined by natural levees."[14]

The paper also introduced for the first time the concept that the weight of the sedimentary deposits of successive deltas caused local down-warping of the Earth's crust, which created a geosyncline.[15] The delta was naturally sinking under its own weight. The work was one of several contributions on delta studies published by the Louisiana Department of Conservation.

EARLY GUSHERS

By the time of Kniffen and Russell's collaboration, the nascent oil industry was forming. By 1918, Louisiana ranked sixth among oil-producing states mainly due to northern production.[16] The state issued the first coastal zone oil lease in 1921, and land development companies began acquiring huge tracts of swampland. Timber and fur companies that had exhausted their land, like Continental Land & Fur Co., were incentivized to hold onto their tracts and lease them for exploration. In fact, the oil boom promised that even land too wet for agriculture or timber had potential value for what lay below its surface in mineral rights. During the 1930s, as swamp and marshlands suddenly became valuable, legal issues of ownership arose. The state had title to navigable waterways, which hinged on the boundaries of water bodies in 1812 when Louisiana was admitted to the Union. New appraisals of property values were required. Russell's fieldwork in alluvial morphology attracted interest in soliciting his skills as an expert witness in the various land title lawsuits. Russell's extracurricular work as an expert witness on landforms sometimes earned him more money in fees than his university salary. Charles Anderson writes in his biography of Russell, "He and Howe presented evidence that won Louisiana title to extensive water bodies in southwestern Louisiana. From this activity, came the addition of the term 'Chenier,' meaning ridge of sand, to the terminology of geomorphology on Cameron and Vermilion parishes in 1935."[17]

In addition to Howe's academic responsibilities, from 1934 to 1940, he served as director of research for the Louisiana Geological Survey, which was supported by the petroleum industry. The survey brought oil money into the department that supported more faculty and graduate students. Oil money subsidized fieldwork and made possible the geologic mapping of the state's parishes. And it established bulletin publications of the State Survey. Howe personally authored or coauthored the first eight parish bulletins. The papers emphasized the importance of the thick, elongate, sedimentary sequence paralleling the coast, which is the main source of Louisiana's petroleum. Howe also developed concepts of salt dome growth and recognized the significance of subsidence under deltaic loading, Pleistocene terrace formation, and the Quaternary deltaic history of coastal Louisiana.[18] The petroleum lobby wanted to expand the geologic survey under LSU's management with proposed legislation to triple their fees with new drilling permits. However, Howe and Russell resisted expansion pressures. They cited the difficulty of training personnel to interpret geologic evidence in the densely vegetated and muddy coast. "In order to establish precise locations for necessary boring and land surveyors, they had to cut trails through the swamps or walk miles on unstable floating marsh. In some cases, botanists, chemists, and other specialists were included in the field parties."[19]

In 1937, Russell was given the first Wallace A. Atwood Award by the Association of American Geographers. His groundbreaking report established him as one of the leading geomorphologists in America.[20] Russell served on the Committee on Geophysics and Geography for the Department of Defense and served as adviser to the Office of Naval Research. During World War II, German U-boats prowled Gulf waters to disrupt Allied shipping lanes from the Mississippi River. After the war, in 1949, Russell was urged by army and navy officers to help improve the "trafficability" of vessels throughout the coastal complex. This offer came as he was named dean of the Graduate School at LSU. With the assistance of James P. Morgan, he presented a proposal to the Geography Branch of the Office of Naval Research to study the ability of large vessels to navigate the shallow, muddy Louisiana coastal marshes. This study led to the establishment in 1954 of the Coastal Studies Institute with Russell as director,[21] as well as the dredging of navigational canals. Today there are ten major navigational canals connecting the Gulf of Mexico to inland Louisiana ports. Studies indicate that the presence of these canals allows salt water to intrude into the freshwater marshes, especially during storm surges. Dredging of straight canals through channels that previously meandered accelerates the speed of storm surge and tidal action, causing destruction of the healthy wetlands. In addition, canals with high spoil bank edges—where the dredged mud is stacked along the bank of the canal—disrupt the hydrology of wetlands. This results in deterioration of marshes and ultimately loss of land to open water.[22]

FISK'S ARRIVAL

Like the Louisiana Geologic Survey, the Army Corps of Engineers was interested in commandeering research labor from the LSU department. They were seeking a better understanding of the physics and morphology of the Mississippi River. The Corps in 1941 hired Harold Fisk, who had arrived at LSU six years earlier.[23] With expertise in volcanic rocks, Fisk began making discoveries in central Louisiana and formulated an explanation of Quaternary deposits. For the Corps, Fisk undertook a comprehensive geologic study of the entire alluvial valley of the Lower Mississippi. Nothing of such magnitude had previously been attempted.

The Fisk study, completed in 1944, included a summary of the valley's characteristics, chronology, and historical evolution. The investigation provided a glimpse into not only the major factors that led to the establishment of the river's modern course but also what may shape the river's future behavior. Fisk's team used detailed topographic maps, aerial photography, and historical accounts of the river valley, which included narratives from sixteenth-century Spanish explorers, to help identify abandoned courses of the Mississippi River and its tributaries. They also incorporated data from sixteen thousand soil borings.[24] Fisk revised the original sequence proposed by Russell. They worked out some of the details of the development of the deltaic plain. In later work, LSU researchers further revised this sequence.[25] Fisk left LSU in 1948 to join the oil industry. He became chief of the Geologic Research Section of the Humble Oil and Refining Company in Houston and stayed on as a consultant to the Army Corps of Engineers.[26] The Fisk study had a profound impact on the geologic understanding of the Mississippi River Valley and would drive Mississippi River engineering for decades.

Along with the report were several volumes of multicolored, detailed topographic and geologic maps that set a new standard for geologic illustrations. These maps trace significant river course changes over the past two thousand years. For instance, the river has taken at least three different routes through Louisiana to the Gulf of Mexico; its present course through New Orleans dates only to around 650 years ago, although more recent studies suggest its present course may be younger.[27] During his service to the Army Corps of Engineers, Fisk was apparently shocked at the militant culture of the Corps, which operated under strict standard procedures. "For example, whenever they began a new construction project, such as a levee setback, they made borings at very regular intervals without considering the surface geology of the area."[28] Fisk and his team early on established definite relationships between types of sediments such as gravel, sand, silt, and clay and the common, different depositional environments of the floodplain such as natural levees, low flood basins, abandoned channels, and point bars—all of which was later recognized as a major breakthrough in classic sedimentology. As Fisk busily mapped abandoned river courses and stages of the current meander belt, the Army Corps of Engineers was studying alluvial river models in the laboratory. Residents and researchers, meanwhile, began to note the disappearance of Louisiana's marshlands.[29]

NEW UNDERSTANDING OF COASTAL PROCESSES

During this period of erosion and in the following decades, a range of new research revealed the river's mechanism of delta construction and ultimately the impacts that both the Army Corps of Engineers' ever-growing system of levees to hold the river in a single channel and the growing labyrinth of oil and gas canals were having on the lower delta marshlands. The early research on mounds, villages, and the meandering Mississippi and its deltas began to open new approaches to teams of geomorphologists, geologists, and archaeologists. "A wedding of cultural and physical science took place, resulting in what Kniffen in 1958—with a premonition of what was to happen nationwide in the 1970s—called the birth of cultural ecology." Later studies followed this direction, with particular attention to the cyclic nature of delta growth.[30] Prior to the 1980s, it was universally thought that the coastal marshlands were in symbiotic balance. But geologists began to gather and examine historical aerial photographs and other evidence that revealed a very different story. Coastal erosion in Louisiana was accelerating.

In 1964, the Louisiana geologist Sherwood Gagliano began a series of studies on dynamic formation and erosion of river deltas, as well as on the ecological devastation caused by disrupting the Mississippi's natural sedimentation cycle. His 1964 paper, "Cyclic Sedimentation in the Mississippi River Delta," looked at the natural effects of river deltas when rivers changed course and began building new deltas. The abandoned delta was essentially "starved" of nourishment and began a coastal retreat that led to its eventual inundation by seawater. Gagliano examined subdeltas around southeastern Louisiana that were no longer main channels of the Mississippi River. His work was joined by a raft of studies by natural scientists that coincided with the emergence of the environmental movement in the late 1960s. Evidence mounted that correlated land loss to both the management of the Mississippi River and the promiscuous oil and gas exploration and drilling.

In 1971, the Louisiana Legislature established the Louisiana Advisory Commission on Coastal and Marine Resources. The same year, a pair of studies was released by R. H. Chabreck that quantified land disappearance in the coastal zone at a rate of 16.5 miles a year. Titled "Ponds and Lakes of the Louisiana Coastal Marshes and Their Value to Fish and Wildlife," the study relied on a helicopter survey of marsh vegetation and soils. Chabreck sampled quarter-mile intervals over a study area of more than 12,000 miles, followed by a second survey of 20,488 miles.

These studies were compiled in the survey, *Hydrological and Geologic Studies of Coastal Louisiana*, in which he began pushing for a more coordinated state-led response to coastal land loss.

Mapping studies by coastal scientists continued through the 1970s, showing that land loss had nearly doubled by the end of the decade. Evidence pointed overwhelmingly to man-made factors, and a coastal restoration movement began to take hold: "The apparent causes of the high rates of land loss include the harnessing of the Mississippi River by levees and control structures which reduce tendencies toward natural diversion and funnel valuable sediments to deep, offshore waters. Additional factors include canal dredging and accelerated subsidence related to mineral extraction, both of which are often associated with saltwater intrusion. The net effect is a rapidly accelerating man-induced transgression of a major coastal system."[31]

Essentially, practices to control the river, which were thought to be either benign or beneficial for two centuries, suddenly became tied to an alarming rate of coastal erosion. Around 1970, Gagliano began another series of landmark observations that measured the impact of levees on protected land. He found that levees were contributing to a separate problem related to land loss. Their very weight was causing subsidence. He identified three separate processes: (1) by cutting off the natural flow of water, levees were essentially starving the root systems of the land inside the protection rings; (2) the levees themselves were causing the land to sink, since they resided on mud—consisting of organic peats and soft clays, silts, and sediments—that was too soft to bear their weight; and (3) the organic peat on developed land inside the levees shrank as the water was drained and pumped outside of the levee system. "Furthermore," Gagliano wrote, "when dried, they shrink appreciably with a volume reduction of as much as 50 percent or more in the peats." The clays fared a little better, with a maximum reduction of 10 to 15 percent if dried completely. But when exposed to oxidizing conditions, through diking and draining, they sank further.[32]

Drained back-swamp areas—like many of the postwar neighborhoods developed in New Orleans and adjacent suburbs—were simply poor landforms to build on. They could sink by several feet. Other practices such as using fires for clearing stumps or accidental fires could smolder in the peat for months and cause further subsidence. "The net effect is that the surface of the newly reclaimed land may be lowered five feet or more below sea level within a decade after drainage. If the drained area has ponds and small lakes, the effects may be even more drastic."[33] Starting in 1973, Gagliano began advocating for controlled diversions along the Mississippi River and the need to deploy the river's sediment load to replenish the marshlands through a dynamic management plan.[34] But dedicated funding for restoration projects and supporting applied research would not become a reality for another decade.

In the late 1970s, the US Fish and Wildlife Service and the US Bureau of Land Management contracted with Gagliano and his firm, Coastal Environments Inc.

(CEI), to produce a series of habitat maps for use in planning for Outer Continental Shelf (OCS) oil and gas development and the potential impact of future expansion on fisheries. It resulted in the "Mississippi Delta Plain Region Habitat Mapping Study" in 1980, under the direction of Karen Wicker, also of CEI. Wicker developed a methodology for establishing hydrological units and analyzing habitat maps to determine change. Wicker's study used data imagery from aerial photos taken in 1978, which she overlaid with previous maps to produce a series of new maps of the entire Louisiana coast, which consists of two plains: the Mississippi River Delta Plain between the Bird's Foot Delta south of New Orleans to Vermilion Bay in Iberia Parish; and the adjacent Chenier Plain in southwestern Louisiana. The Wicker habitat maps produced dramatic results: 465,000 acres of marsh had been lost in the Mississippi Delta between 1955 and 1978, with an average loss of 32.3 square miles per year (20,600 acres). But the Chenier Plain in southwestern Louisiana was sinking faster. The total loss came to 25,000 acres, or 39 square miles, a year, twice the rate identified by coastal scientists ten years before.[35]

ROOT CANALS AND EROSION

As the methodologies for studying land loss improved, scientists using aerial photographs started recognizing another correlation to the land loss phenomenon: the state's weblike labyrinth of canals—thousands of miles of them. By comparing aerial maps, researchers in the 1970s began plotting the conversion of wetlands to open water as a result of canal construction. In 1983, a study by Eugene Turner using Wicker's 1980 mapping study and earlier data argued that canals were causing local submersion of wetlands. The density of navigation and oil pipeline canals in a given geographic area was directly proportional to high rates of land loss, especially in younger, abandoned deltas, such as Terrebonne and Plaquemines Parishes, southeast of New Orleans. The question became not whether canals directly contributed to land loss but by how much. An emerging theory about *indirect* land erosion associated with canals would become a major point of contention and controversy that plunged restoration science into a political quagmire for decades in Louisiana.

In basic terms, land loss meant converting wetlands to open water. Turner's study went on to investigate how canals might be harmful to marshes, which bled into questions of horticulture, hydraulics, and invasive species. Canals opened saltwater channels into fresh and brackish marshes. This had some effect on plant and marine ecology. Canals entrapped water behind dredged spoil ridges stacked along the edges of canals during the excavation process. Turner argued that impounded water altered salinity and decreased nutrient, organic matter, and sediment exchange. It changed vegetation composition and reduced vegetation productivity. Land loss, his research found, was directly proportional to canal density in certain areas: "Canals also allowed salt water from the Gulf tides to seep into the coastal interior, well beyond the protective natural barriers, killing cypress swamps and freshwater marsh vegetation and increasing subsidence in these areas."[36] Gagliano had written in 1973 that canals threatened to "seriously upset natural circulation patterns and water chemistry." Canal excavation had made "the petroleum industry the greatest wetland canal builder." Gagliano cited the practice of adding new channels without any effort to refill the old ones. "When a canal is cut, it often becomes a permanent feature." Single canals became webs of canals that coalesce into small lakes and bays.[37] Eventually, pipelines connected offshore discoveries to onshore processing and transportation facilities. "Flow lines and pipelines, connecting the fields infrastructure, sat in canal bottoms or on their banks."[38]

But canals also signaled oil field activity, which included surface-level disposal of brines that contained several times higher levels of salinity than seawater. And then, what of the oil pipelines themselves? Louisiana soils are particularly caustic and degrade industry infrastructure. Subterranean leaks and ruptures caused unknown havoc on the fragile ecology. A changing plant ecology was then less resilient to opportunistic species of beetles, nutrias, birds, and other creatures. Still, an even thornier question related to the fact that this growing web of canals resided on private property, often owned by absentee owners who received oil and gas royalties. They had a vested interest in resisting any sorts of claims of culpability in coastal erosion by oil and gas interests.[39]

CANAL EXCAVATION BY INDUSTRY: SUGAR, TIMBER, AND OIL

Canals provided access to the resources in the marsh-swamp complex. Historical maps indicate that marsh and swamp drainage ditches were excavated as early as 1720. Such watercourses helped drain agricultural land and extract cypress timber. The earliest available maps indicate drainage channels were the first artificial waterways used in resource exploitation. They were built by the French for both land drainage and access channels. Coastal dwellers cut small, narrow marsh passageways called pirogue trails or traînasse trapping ditches for quick access to their traps and an easy way to move furs and other supplies. Hence, the most intensive trapping networks prior to the twentieth century developed in muskrat and nutria feeding areas. By 1915, as muskrat fur became fashionable, pelts increased in value and trappers extended their hunting ditches into muskrat habitat. Trapping canals connected fields to camps, where the animals were skinned and dried. During this early period, a good trapper could catch up to two hundred muskrats a day.[40] A string of men working a section of ditch cost about $10 to $15 per mile. The channels were small but effective in the trapper's efforts to catch muskrat, mink, otter, raccoon, and nutria, which were introduced from Argentina in 1937 and are now an invasive species.

But the most intensive were the canals for logging, petroleum, and transportation. In order to remove cypress from the swamp, the lumber industry built navigable connecting canals through which pull-boats dragged large stands of timber that left still-visible scars. The sugar and timber industries collectively decimated the Louisiana cypress swamps as land reclamation projects using levee and drainage programs coincided with the rise in the mid-nineteenth century of major sugar plantations. Wetland reclamation techniques were based on a system of levees, internal drains, and pumping plants. Once the area to be reclaimed was defined, a large dredge-boat canal at least 25 feet wide and 5 feet deep was constructed around the project's perimeter. In building these canals, the dredged spoil was used as a protective levee with a height of 5 to 6 feet and a top width up to 12 feet. When the boundary canals and levees were completed, the internal drainage network was constructed.[41] The political ecology led to profit-taking twice over: denuding and selling the cypress forests to clear land for planting monocrop sugarcane.

The sugar industry and its subsequent demand for wood-powered steam in the mid-nineteenth century further decimated the state's old growth timberlands. The introduction of the railroads provided direct access to logging—while disrupting the ecology of the marsh through levee rail beds that impounded water. "By the 1920s, operators had removed 4.3 million acres of timber from the state, an area about the size of New Jersey."[42] As the cypress and other virgin stands were depleted and the practice ended, only the canals remained as evidence. However, the collapse of the cypress industry coincided with discoveries of petroleum and natural gas along the coast, which would amplify the extractive commodification of the coastal forests and marshes. After 1930, oil companies began to use canals in their work, which required cutting larger passageways through already traversed marshes and thereby changing the transportation patterns along the coast. These patterns were further altered with the completion of the Gulf Intracoastal Waterway through the marshes in the 1940s. "Mudboats" were utilized to excavate ditches west of Vermilion Bay but were not employed east of the Bay. The Larose ditch digger, introduced around 1933, could move through the deltaic plain by cutting trails in the floating vegetation and highly organic soils.[43] A floating vessel 20 feet long and 5.5 feet wide, it was powered by an inboard engine. It housed two bow-mounted 36-inch rotating cutting blades designed like an airplane propeller capable of excavating a 6-foot-wide, 6-inch-deep channel. The propeller cut the vegetation and at the same time pulled the boat through the marsh. The machine could cut a traînasse in five inches of water.

HABITAT AND ECONOMIC LOSSES

In practice, habitat loss associated with industrial canal and pipeline dredging—as well as routine bleeding of oil and brine into the surrounding estuary—was a well-known occurrence for much of the twentieth century. As early as 1913, Percy Viosca, a Tulane-educated conservationist who was head of the Louisiana Department of Conservation, later renamed the Louisiana Department of Wildlife and Fisheries (LDWF), began sounding the alarm through two separate administrations of state government. By 1925, Viosca was proselytizing about disappearing wetlands and saltwater intrusions from navigation and drainage canals as well as brine water dumping from wells. "Man-made modifications in Louisiana wetlands, which are changing the conditions of existence from its very foundations, are the result of flood protection, deforestation, deepening channels, and the cutting of navigation and drainage canals," he argued.[44] And an agency biologist reported in 1940, "Through the digging of canals[,] good muskrat country can be readily and quickly ruined."[45] It wasn't just muskrats being affected. Oyster beds were also being fouled, which was a problem because oysters represented a growing industry. The state began leasing oyster seed grounds along the coast in the 1910s, and by 1960, it had leased over 70,000 acres. The number climbed to 400,000 acres by the end of the century. Gulf oysters accounted for two-thirds of the nation's domestic oyster supply.[46] At a 1953 conference on oil and gas impacts, James McConnell, the LDWF's oyster and water bottoms chief, provided empirical observations about the disruptions caused by spoil ridges. The industrial-like arrangement of tank batteries, processing facilities, and disposal areas was incompatible with the marsh setting. Houck quotes McConnel: "Everyone should recognize that there are other very old industries here . . . that are now being seriously affected by these mineral operations."[47] The LDWF consistently found thick layers of floating oil in the coastal estuaries and oil-related drilling mud that settled at water bottoms where oysters bred. "They are going to destroy an industry to build another industry," C. H. Brookshine, an LDFW commissioner, stated in 1955.[48] A year later, the 1956–57 biennial report by the Louisiana Wildlife and Fisheries Commission noted "drastic increases in salinity" and "rapid deterioration" of the marshes around Barataria Bay Waterway. At that point, at least two wells a day were being drilled along the coast.[49]

In a 1959 report on drilling in the Rockefeller Wildlife Refuge and Game Preserve, an area supposedly demonstrating the compatibility of oil and wildlife for many years, an LDWF researcher noted that the more than 20 miles of access canals there, within a few years, had enlarged by 20 percent. In the early 1960s, a report out of Texas concluded that canal dredging could also be a reason for increased salinity in the Louisiana marshes. Van Lopik of LSU echoed the findings of LDWF scientists that "many oil company canals, with their flanking spoil banks, cross the marsh giving rise to changes of drainage, and hence, vegetation. Thus, relatively minor modifications in marshland drainage may create many unforeseen problems." By 1971, Lyle St. Amant of the LDWF was even more emphatic, pronouncing the canal effects as for the most part "irreversible and permanent" and representing a "true ecological upheaval." He described wastewater discharge and pollution as "rampant and uncontrolled," reasoning that "the coastal region of the state was a virtual trackless wilderness" that allowed "oil waste, leakage, sludge, and other materials [to be] dumped into the marshes and bays without

FIGURE 6. Derrick in the Marsh. This undated photo shows an oil derrick surrounded by a waste pit in Terrebonne Parish. A million oil and gas wells have been permitted in Louisiana since the 1901 gusher in Jennings. Oil and gas activities caused more than 70 percent of land loss in the Barataria-Terrebonne basin. Image courtesy of the Historic New Orleans Collection, © Douglas Baz and Charles H. Traub, 2019.0362.93.

regulation or control."[50] By 1973, even the Army Corps of Engineers recognized that "onshore pipeline construction may cause irretrievable marshland loss."[51] More studies detailed the mechanics and extent of the damage. In 1983, an article by Turner cited the work of more than twenty professionals in the field, each investigating one aspect of canal damage or another. Turner's team called for limits on dredging permits by the state and the Corps of Engineers, as well as new construction techniques and requirements for backfilling new and existing canals. "It wasn't arm waving. You had data across the coast," said Turner. "We had maps of change. We had maps of little ponds, big ponds, straight lines. Finally, people were looking at this as a whole system. So, it fit. It was a whole coastal view. There were differences in there, but, my God, every place on the coast was losing land."[52]

Once upon a time, canal spoil ridges were seen as beneficial for hunting and fishing. Hunters would burn the grass on one end of the muddy strip and shoot the animals retreating toward them. Some landowners would build and lease camps on spoil banks. In 1971, a group applying for a 6-mile pipeline through the marsh in southern Louisiana at Pecan Island was approved by the interstate regulatory Federal Power Commission, which found that whatever disruption caused by the canals would be more than offset by improved deer habitat and access to trapping grounds provided by the spoil banks.[53] Some landowners believed that the spoil banks would protect them from hurricanes. "In the background, there was always the possibility that oil companies would want to re-access the wells for more production."[54] Turner and Donald Cahoon conducted another major study in 1987, "Causes of Wetland Loss in the Coastal Central Gulf of Mexico," which made the first serious attempt to quantify the land loss indirectly attributable to pipeline construction in the wetlands. It found that the oil pipelines directly contributed to 4 to 5 percent of land loss from 1955 to 1978, but a much higher percentage of indirect effects was caused by "water logging." When water is unable to naturally drain back toward the Gulf, the salt water begins to change the chemical and biological conditions of the marsh soil. Over a short time, the marsh vegetation will deteriorate and soils will oxidize, leading to another cause of land loss—subsidence. Over time, internal ponds will enlarge. Pipelines that ran into the marsh from OCS drilling, they estimated, were responsible for 8 to 17 percent of land loss.

Turner and Cahoon analyzed the few backfilled canals in the region and determined that backfilling reduced direct impacts of the canals by as much as a third.[55] From 1979 to 1980, the Louisiana Offshore Oil Port excavated a 5-mile pipeline canal, which was then backfilled. Field studies done in 1985, a relatively short time later, showed a third of the spoil areas to be between 23 percent and 75 percent covered with renewed marsh. Although the backfill had not yet fully restored original conditions, the corrective resulted in shallow water areas with higher habitat value for fish and wildlife compared to unfilled canals.[56]

The implication that federally permitted pipelines in Louisiana caused significant land loss led the US Minerals Management Service (MMS) to initiate coastal impact studies of its own.[57] The MMS published "Pipeline Impacts on Wetlands: Final Environmental Assessment," which found that during the period 1951–82, the government approved 72,870 miles of pipeline rights-of-way on the Outer Continental Shelf in the Gulf of Mexico. Approximately 130 of these pipelines made landfall on the Louisiana coast. The report looked at five pipelines built between 1978 and 1984 and determined that pipelines and canals did have major impacts on marsh vegetation. Fast forward to 2009, when the same agency, renamed the US Bureau of Ocean Energy Management (BOEM), said that construction of OCS-related pipelines can cause intense habitat changes and conversion to open water locally. It found that the practice of direct dredging opened areas to saltwater intrusion and that spoil banks altered flooding patterns.

But impacts associated with specific pipeline canals varied. Some pipelines contributed to habitat loss and others didn't, depending on the quality of mitigation applied and the kind of habitat that it crossed. A report by Johnston, Cahoon, and La Peyre stated, "Our analysis also suggests that the cumulative effect of hundreds of pipelines contributes to regional trends in land loss."[58] In 2010, a backfilling test on old oil and gas access canals in the Jean Lafitte National Park's Barataria Unit compared success rates in two sections, one restored simply by pushing in the spoil banks and the other by adding soil from other sources to hasten the process. Both demonstrated progress. Somewhat unexpectedly, the test area where the spoil banks were simply pushed in recovered at the same rate as the section with the soil enhancement.

BACKFILLING: THE QUICK DEATH OF A CONCEPT

Turner argued that backfilling old canals costs a fraction of the proposed river diversions. Several times, he said, the Environmental Protection Agency (EPA) argued for pilot projects to backfill canals. His study with Walter Sikora in 1985 looked at all known examples of backfilling from 1979 to 1984 and concluded that, where properly done, the technique restored natural hydrology and began the process of infill of the open canals. In 1987, Turner and C. Neill did a follow-up study of some thirty sites, confirming further progress.[59] In 1994 and 2004, the ten- and twenty-year marks, more follow-up studies showed more progress still. In 2005, an analysis by Turner's graduate student, Joel Baustian, showed wetland recovery in 65 percent of the spoil areas and 25 percent of the formerly open canals.[60]

The state Department of Natural Resources (DNR) Coastal Management Division made one attempt to implement backfilling. Prompted by the Sikora and Turner study in 1985, program administrator, Joel Lindsey, forwarded it up the chain to the secretary of DNR, which regulates the oil and gas industry, with a memorandum summarizing its conclusions that "even partial backfilling" of a canal was beneficial, creating a shallow lake occupied by marsh-typical organisms and reducing "water logging" in the adjacent wetlands, which allowed revegetation of marsh plants to occur.[61] The fieldwork was characterized as "done in a professional manner," "outstanding," and "excellent." Continental Land & Fur, a major royalty owner, opposed it, as did the state DWF, which concluded that "several recommendations stated in the report cannot be justified" and requested that "the report not be published in a final form until our concerns are addressed."[62]

According to Len Bahr, a former state coastal scientist-turned-critic, the state DNR had an incestuous relationship with the industry that corrupted its mission of overseeing oil and gas exploration and production. In 1989, DNR was also given responsibility for implementing a small program of coastal restoration managed by the Coastal Wetlands Authority. This was the predecessor of the Coastal Protection and Wetlands Authority (CPRA), which today oversees billions of dollars of restoration and protection spending—subsidized by oil and gas royalties.[63] "The fact that DNR was given responsibility for overseeing the conflicting missions of coastal restoration and energy production is no accident of course, having been masterminded by the energy industry," said Bahr, who served as the coastal adviser to Gov. Mike Foster. "Purveyors of oil and gas were clearly fearful that coastal management and restoration might step on their lucrative financial toes."[64] According to Bahr, it was ironic that the need to restore the coast is the result of damage caused by the fossil fuel industry. But as we will see in the next chapter, the oil and gas industry managed to reposition itself not as a culprit of land loss but as its victim.

Meanwhile, the industry contested the applicability of a Louisiana law that mandated restoration of wetlands to their preexisting condition, called Section 705. Backfilling, the industry argued, was only required "upon cessation of use for navigation purposes." A company might at some time want to go back and work over a rig or a drill in a different direction. And in the meantime, the canals were "navigated" regularly by Louisiana fishermen. The arguments stymied backfilling within the DNR's Coastal Management Division. Consequently, DNR announced a temporary moratorium on Section 705, which had rarely been implemented.[65] The Turner and Sikora study was sent for review to LSU's Center for Wetlands Resources, which found it "inconclusive." The moratorium was never lifted. Nor are there any projects or studies in the state's current master plan for coastal restoration to test backfilling. Today, the thirty projects surveyed by Turner and his colleagues over the past four decades represent almost the entire sum of all backfilling done in the Louisiana coastal zone. That's fewer than 10 restored miles of more than 14,000 miles of canals from the Texas border to Mississippi. Following up in 2014, a master's thesis in environmental management by a Duke University student examined backfilling potential coastwide and its projected costs. It found over 100,000 acres damaged by canal banks, of which nearly half had the necessary features for success. "Based on the highest cost per acre estimate available," this acreage could be successfully backfilled for $8.7 million. By comparison, the state's 2017 iteration of the master plan outlined a suite of techniques (none of them backfilling) to restore an area slightly less than 20,000 acres at an estimated $3 billion. This was nearly four times the cost per acre using techniques less proven than simply pushing in the spoil banks and letting nature do the rest. Backfilling canals with material from existing spoil banks would restore some of the natural hydrological function at a low cost-benefit ratio. These small-scale restoration projects through backfilling would have allowed the marsh to be "stitched" back together relatively cheaply. "There are quite a few thousand abandoned canals. If they were officially abandoned, [the state] could have them backfilled, but they didn't do it. There are a lot more that are practically abandoned but not legally abandoned."[66]

According to Turner, the very act of backfilling assigns the culpability of oil and gas production to marsh erosion: "If you're going to do it, it means someone has to be blamed." The industry has resisted taking responsibility, and therefore backfilling was never embedded in the larger social framework of restoration.[67]

Today another major hindrance to backfilling is the fact that many of the spoil ridges have submerged over time so that there is no ready dirt to push back into the canal, according to critics of the approach.[68] Turner and his team argue that spoil banks alone often do not completely fill the canal with sediment. "However, this does not detract from backfilling as a viable restoration technique, because the canal becomes shallower and provides excellent habitat for a variety of wildlife."[69] As recently as 2018, Turner and Giovanna McClenachan argued that the abandoned canals connecting to the estimated 27,483 plugged and officially abandoned oil wells in the fourteen coastal parishes as officially labeled by DNR provided ample opportunities for a program of spoil bank infill and monitoring. "The total length of spoil banks in 2017 was long enough to cross the Louisiana coast east-to-west 79 times with a spoil bank height up to 3–10 times the natural tidal range."[70] Just dragging down the remaining material from the bank back to the canal could be an inexpensive long-term strategy. "The absence of a State or Federal backfilling program is a huge, missed opportunity to 1) conduct cost-effective restoration at a relatively low cost, and, 2) conduct systematic restoration monitoring and hypothesis testing that advances knowledge and improves the efficacy of future attempts."[71] The price of backfilling all canals would be $335 million dollars, or 0.67 percent of the state's master plan for restoration. It's a pittance of the profit from extracting the oil and gas below over the past century.[72]

SUBSIDENCE FROM DRILLING ITSELF

Between 1900 and 2017, the state permitted 76,247 oil and gas wells in the fourteen coastal parishes. Wetland destruction in these oil and gas fields occurred quickly. Some erosion and subsidence are natural, such as geologic faulting, sediment compaction, long-term delta lobe cycle, variability in river discharge, tidal exchange, wave erosion, and weather. While the more than 30,000 kilometers of canals dredged in the marshes are known for causing dramatic wetland loss, due to cumulative effects of altered surface hydrology, there was another correlation between deep well extraction and the disappearance of the coast. In the early 2000s, researchers began studying the impacts of drilling and extraction itself.

Decades of fluid withdrawal from oil and gas reservoirs, some believed, had increased subsidence rates in localized areas. Robert Morton, a geologist with the United States Geological Survey (USGS), analyzed what he called subsidence "hotspots" in Terrebonne Parish. He pointed to a correlation between drilled wells and wetland loss in marshy areas. According to Morton, an increasing amount of subsidence in these hotspots was directly attributable to the removal of oil and gas during the same period. Morton had worked as a petroleum geologist for a major oil company with field assignments both offshore and in Lafourche Parish, where his later studies would center. He had witnessed subsidence firsthand, noting at times how pipe casing collapsed. He did not expect his findings for the USGS to be dramatic or controversial. He and two colleagues reported on hydrocarbon production and resulting pressure losses in several large South Louisiana fields. Production showed large spikes, peaking in the 1970s, while pressure in the reservoirs fell, ultimately to near-zero, which is when the surface began to sink. The highest subsidence rates closely tracked the maximum rates of fluid extraction. Each of these fields had pumped out as much as 920 billion cubic feet of gas, 55 million barrels of oil, and 87 million barrels of brines and related waters, which were very big numbers. The report concluded, "The primary factor causing accelerated interior wetland loss in south central Louisiana between the 1950s and 1970s was accelerated subsidence and probably fault reactivation induced by rapid, large volume production of hydrocarbons (primarily gas) and formation water."[73]

By 2015, approximately 100 trillion cubic feet of natural gas and 12 billion barrels of oil had been extracted from the Louisiana coastal zone. The brines and produced waters that came up with them at least equal the figure for oil. "That removing this colossal volume of material will impact the surface above is supported by the best evidence available from home and abroad, throw in a pinch of common sense," writes the environmental law professor Oliver Houck.[74] Morton had to rely on analogical studies in coastal Texas and other coastal locations because of a lack of available data in Louisiana. As he and Bernier wrote, "Despite numerous field studies around the world since the 1920s and acknowledgment by the petroleum industry that hydrocarbon production can induce subsidence," the presence of this same phenomenon in the Mississippi Delta region "has been largely ignored."[75]

Oil and gas drilling has been associated with significant subsidence elsewhere. A well-known example is Long Beach, California, where two production fields were linked to substantial drops in the land above. Long Beach was once known as the "Sinking City" after 3.7 billion barrels were extracted from the Wilmington Oil Field, creating a 20-square-mile "subsidence bowl" of up to 29 feet deep around the Port of Long Beach and the coastal strand of the City of Long Beach. In the 1950s, water injection was shown to repressure the oil formations, stop the underground compaction as well as surface subsidence, and increase oil recovery—which ultimately led to the California Subsidence Act in 1958, which requires that well operators use water injection to repressurize wells.[76] By 1962, operators spent over $100 million on projects that included a massive repressurization program using injected salt water to reduce and in some cases reverse subsidence.[77] Subsidence episodes occurred in Venezuela's famed Lake Maracaibo and sites in Russia, Indonesia, Malaysia, and the Norwegian North Sea, "causing concern for platform safety." Experiences in the Netherlands have led to regulations requiring oil

FIGURE 7. Pipelines. Signs warning against anchoring or dredging dot the coastal marshlands. Thousands of pipelines, both functioning and abandoned, litter the coastal zone and damage fishing boats. Canal dredging and spills have decimated the once-robust marshlands that buffered communities from seasonal storms and hurricanes. Photo courtesy of Kerry Maloney.

companies there to routinely monitor and report rates of subsidence relating to extraction as they go forward.[78]

In Louisiana, petroleum lies in layers of sand pressed under layers of mud and caps of salt. The sand grains themselves are irregular, packed together like jacks in a box and buffered by the petroleum and brines. Pumping out these fluids reduces the total mass below ground. It also reduces the pressure of the formation that kept the roof up. And it removes the buffer fluids that keep the sand grains apart, which now jam more tightly together. The result is that the strata above begin to sink. It may also depressurize formations along fault lines, triggering shifts. The shallower the wells, "the more localized and dramatic these effects." The impacts of deeper wells are less pronounced, but their impacts may extend widely.[79]

Morton also theorized that deep well withdrawal may trigger fault activity among the two fault lines that crisscross the lower portion of the state. That research was controversial. Critics argued that oil and gas wells at 17,000 feet below the surface in Louisiana are much deeper than the analogous sites he considered in Galveston and California. Most of the subsidence in Louisiana, they argued, is closer to the surface and likely has more to do with organic compaction rather than depressurized wells or drilling-caused fault activity. Yet few follow-up studies have been pursued. "Morton was one of the few in the wilderness asking such questions," says Houck.[80] Making the science nearly impossible to advance provides cover for industry defenders and skeptics who claim that there is not enough data yet to support the claims.

Pointing to a fifty-year-old mandate in California that oil and gas companies reinject wells to repressurize them, Houck says, "In every other state, that is common practice."[81] Many researchers were not prepared to accept Morton's conclusions, arguing that correlation does not mean causation. "He spent his career looking for the smoking gun and never found it," according to Denise Reed, former chief scientist at the Water Institute of the Gulf.[82] Other geologists were saying there wasn't enough data. "In brief, we were data short and interested-in-getting-it short," writes Houck. "A sweep of related literature published ten years later stated that "'in the absence of more direct studies,'" the impacts of subsurface oil and gas extraction "'may never be proven.'" The evidence, it concluded, while suggestive, "'remains circumstantial.'"[83]

In a 2004 article, Reed and Lee Wilson coauthored an article that acknowledged Morton's work on subsidence and down-faulting but added the studies were in their infancy. "In some areas fault movements associated with these withdrawals appear to have resulted in a tripling of subsidence rates," they said.[84] In some hotspot areas of land loss, marsh sediments had sunk by more than a meter below their natural elevation. This pointed to subsidence at rates much higher than the few millimeters per year associated solely with the compaction of deltaic sediments.[85] In 2011, Alex Kolker of the Louisiana Universities Marine Consortium (LUMCON) presented a new method for calculating subsidence rates and found that these rates do indeed fluctuate in relation to fluid withdrawal. Onshore oil production in the state was 114 million barrels in 1945, soared to 437 million barrels in 1968, and then declined to 55.5 million in 2005—which, in sum, tracked onshore subsidence rates directly. "Taken together," Kolker concluded, "these findings point to a tight coupling between fluid withdrawal, subsidence rates, and wetland loss."[86] Extraction was by no means the sole cause, but it increasingly seemed to be a significant one. In 2014, investigations by Chandong Chang and associates at Stanford University discovered that subsidence continued after production had ended. Fluids were apparently leaking back into production cavities from adjoining areas. The first blitz of withdrawal lowered surfaces by up to 3.5 inches, followed by another potential 3.5 inches in succeeding years.[87]

But more inquiries have gained steam. A 2020 paper by John Day and others pointed directly to depressurized wells and subsidence: a deflated core pressure "induces subsidence and fault activation—especially when the production rate is high." They added that subsidence can continue "for decades" even after most of the oil and gas has been produced, "resulting in subsidence over much of an oil field that can be greater than surface subsidence due to altered hydrology." They also pointed to canals and ponding effects as well as accidental spills and intentional releases of oil and extracted brine water toxic to the area's ecology.[88]

An estimated two million barrels of brine water per day were discharged in coastal wetlands from seven hundred sites. The brine pulled up from oil wells contains toxic materials—such as benzene, ethyl benzene, xylene, and radium—that are then channeled through the canals into the surrounding marshes.[89] "This water is a mixture of either liquid or gaseous hydrocarbons, high salinity (up to 300 ppt) water, dissolved and suspended solids such as sand or silt, and injected fluids and additives associated with exploration and production activities and it is toxic to many estuarine organisms including vegetation and fauna."[90] Spilled oil is also toxic to estuarine organisms.

Meanwhile, Patricia Persaud, an LSU geophysicist, is currently working on research in fault-activated earthquakes in Louisiana that are caused by oil and gas fracking in northern Louisiana, as well as depleted salt domes in South Louisiana. Her work had just begun at the time of this writing.[91] But any findings will likely be disputed by industry. For example, in April 2019, a petrogeologist with the Louisiana Geologic Survey and president of the New Orleans Geological Society penned an op-ed lambasting the City of New Orleans's decision to join a lawsuit with southeastern Louisiana parishes against six oil and gas companies for the loss of the city's buffering wetlands. The geologist-cum-lobbyist argued that the suit takes a punitive approach to an industry that has helpfully shared 3D seismic data with universities, whose early research has found "many if not most" of wetland losses are directly associated with geologic faults. The study, he said, found that most of these faults extended to the surface, and several of them "correspond to abrupt shifts from emergent wetlands to fully submerged areas of open water."[92] In other words, he said, spontaneous movement of the faults is causing the wetlands to submerge, not the onslaught of extraction of oil and gas, disposal of toxic brines, prodigious canal excavation, and associated habitat mortality by the industry.[93]

THE BIRTH OF A GRASSROOTS RESPONSE

As residents of southeastern Louisiana witnessed the alarming disappearance of their surrounding landscape, a small but growing group of wetland advocates and conservationists in the 1980s began promoting awareness of the coastal crisis. But, like the researchers themselves, they were fragmented and divided on key issues. Intense scientific and political disagreements over the causes of wetland subsidence and erosion played out through various strategic plans and efforts to address the many stressors destroying the ecology of the area.

While some researchers focused on the actions by the Army Corps of Engineers to manage the Mississippi River, others pointed to the impacts of the oil and gas industry's canals and hydrocarbon withdrawal. Yet it seems just as plausible that they all worked in tandem. The academic community held its first major wetland conference in 1981 to identify the cause of loss and recommend options. The Coastal Erosion and Wetland Modification in Louisiana Conference affirmed that human activity had "disturbed natural processes" that had for thousands of years maintained an ecological balance between accretion and subsidence.[94] But scientists, community faith leaders, and environmentalists, painstakingly documenting the disappearance of coastal wetlands, ran headlong into misinformation campaigns and complicit legislators that muddied the water over causes of coastal land loss. Any findings that oil and gas exploration was tied to erosion were actively resisted by the energy lobby and state lawmakers. They pointed instead to the Army Corps of Engineers river levees. This despite the fact that research on navigation and pipeline canals used the same principles of water hydrology as the levee's theory, which asserted that elevated ridges like spoil banks and levees disrupt the sheeting flow of sediment deposition.

That same year, the state legislature held a special session and passed Act 41, which created the Coastal Environmental Protection Trust Fund with $35 million to fight erosion. The move coincided with a groundbreaking study in 1981 in which Gagliano quantified the loss of coastal wetlands that was directly tied to the management and leveeing of the Mississippi River.[95] Using comparisons of black-and-white aerial photographs and color infrared imagery taken at five periods from 1890 to 1978, he contextualized the rate of land loss and habitat change within the Mississippi Deltaic Plain, arguing that seven thousand years of land production by the river had been reversed starting in the late nineteenth century and accelerating in the twentieth. Such land loss rates progressed from 6.7 square miles a year in 1937 to a projected 29.4 square miles a year in 1980. The greatest loss occurred in the wetlands and barrier islands. Natural-levee ridges were also disappearing at a very high rate. Gagliano worked with the state legislature's natural resource committee to develop a restoration project list, and in the early 1980s, the legislature called for the creation of a coastal master plan. It charged the petroleum-friendly Louisiana Geological Survey to develop a ten-year plan and oversee restoration activities.[96] It funded research and a set of pilot restoration projects to demonstrate the effectiveness of various restoration techniques. The state also used the trust fund to provide its share of the cost for the Army Corps of Engineers–led freshwater diversion projects. But the project was fraught with mismanagement and lack of oversight. By 1987, only a portion of the $35 million trust fund had been spent, with most of it going to independent studies. No master plan materialized.

The great oil bust of 1980 left the South Louisiana extractive economy decimated. In May 1982, newly elected governor, Dave Treen, introduced the controversial Coastal Wetlands Environmental Levy to tax transportation of oil and gas production that moved through pipelines across state wetlands. Supporters cited research by Turner and his colleagues on the harm of canals and argued that the tax would provide reasonable compensation for the environmental cost of building pipelines. But Treen, who was the first Republican governor since Reconstruction, became a cautionary tale for environmental advocates. He targeted the industry, which responded in kind. In mass mailings, CEOs urged shareholders, employees, vendors, and landowners receiving oil and gas royalties to inform elected officials about the potential economic impacts of the bill on the state's leading industry. The mailer said it threatened increased energy prices, loss of oil field jobs, loss of state revenue, and reduced incentives for exploration. Treen's bill failed, as did his bid for a second term.[97]

Maps produced by the US Geologic Survey and the US Army Corps of Engineers throughout the decade convinced the public of the need for restoration. In the mid-1980s, a new citizen-directed initiative began to coalesce in the southern parish of Terrebonne, where wetlands accounted for 70 percent of the parish's landmass. This disappearance began to alarm the Catholic church and the impact of land loss on its parishioners. In the early 1980s, parish leaders launched an educational campaign with brochures, billboards, and classes to inform citizens. After Hurricane Juan ripped through the parish in 1985, community leaders saw firsthand how the loss of storm-buffering barrier islands and marshes led to increased storm surges and flooding onshore. Moreover, the introduction of marsh management projects on private property using weirs to regulate water flow, which was a restoration effort supported by the state, led to closures of fishing grounds.

OPPOSITION FROM OIL AND GAS

As the decade of the 1980s wound down, a consensus began to emerge, particularly among coastal experts, that the environmental cost of the oil industry had been substantially greater than previously estimated. Jim Tripp, general counsel of the Environmental Defense Fund (EDF), with experience litigating damages from navigation canals, teamed up with Oliver Houck, who was then a member of the National Wildlife Federation and the southern Louisiana archdiocese, along with a number of coastal scientists and researchers who had been studying the area for decades, to write a citizens' plan for restoration.[98] They called themselves the Coalition to Restore Coastal Louisiana (CRCL), which brought many of the groups and opposing viewpoints under a unified agenda.

The CRCL is today the state's oldest active environmental organization. Its capstone report, finalized in 1989, titled, "Here Today and Gone Tomorrow," recommended nineteen action steps for reversing coastal erosion. They included building freshwater diversions from the Mississippi River, bringing regulatory pressure to backfill petroleum canals, establishing a pipeline user fee, establishing a restoration management office in state government, and phasing out new canal construction in the marshes.[99] Some of the recommendations are now part of the state's "Comprehensive Master Plan for Coastal Restoration": using sediment and freshwater from the Mississippi River to slow land loss; pumping dredged materials from the river channel into coastal marshes; and stabilizing barrier islands through vegetation, natural processes, and beach nourishment. Other recommendations targeted the industry, such as developing "alternative means of access to oil and gas sites within the coastal zone" and "marsh restoration by means of plugging and backfilling strategic canals." There would also be a prioritized schedule for backfilling abandoned or little used canals.[100] The citizens' report concluded that oil and gas production and construction of navigation and access canals were major causes of subsidence: "While any single oil and gas canal . . . may have only a minor effect, the cumulative impact of these canals on the coastal zone is devastating."[101] The plan was endorsed by a diverse group, including Catholic Social Services, the League of Women Voters, the Natural Resources Defense Council, a number of local chambers of commerce, the National Wildlife Federation, the Orleans Audubon Society, the Greater New Orleans Tourist and Convention Commission, and the United Houma Nation.[102]

In the report, the authors asserted that 40 percent of the nation's wetlands were under threat and were receiving little national support. "We need to think more boldly, agree more collectively, and act more swiftly if we hope to retain more than a few museums of marsh along the Gulf of Mexico," they stated.[103] A letter from Bishop Boudreaux to the Houma-Thibodaux Diocese stated, "We are morally obligated, as stewards of God's gifts, to protect and restore our coastal wetlands."[104] At the time, new GIS imagery data were providing convincing evidence connecting Louisiana wetland losses to a labyrinth of access and pipeline canals. Studies by the Corps of Engineers, the MMS, and the EPA all confirmed significant industry impacts. Even the *Wall Street Journal* published a series of articles on Louisiana and the oil and gas industry, the third of which was captioned, "Oil's Legacy: Louisiana Marshlands, Laced with Oil Canals, Are Rapidly Vanishing."[105] The CRCL's recommendations struck a nerve with the oil and gas interests. Instead of accepting these findings, the oil and gas lobby fought the citizens' coastal plan. "As they had done since the beginning of the crisis, oil and gas companies and their political supporters joined big landowners in resisting efforts to impose regulatory oversight."[106] They challenged the science, even arguing that some oil and gas impacts were exaggerated, temporary, or even beneficial.[107]

Nationally, oil and gas corporations were simultaneously challenging new federal wetland protections across the board. In 1989, sensing new federal regulations in the wings, the oil giants Exxon, Shell, Conoco, Texaco, BP America, and Arco Alaska teamed up with mining and real estate companies to form a lobby ironically called the National Wetlands Coalition, which successfully lobbied two Louisiana congressmen, Jimmy Hayes and Billy Tauzin, to introduce the Comprehensive Wetlands Conservation and Management Act of 1995, which removed the EPA entirely from wetlands protection.[108] A blitzkrieg followed. The Louisiana-based energy lobbying firm, Louisiana Mid-Continental Oil and Gas Association, funded a report from three LSU geologists; it minimized the impacts of canals, claiming they caused less than 10 percent of erosion and did not account for any off-site impacts. Continental Land & Fur Company, with its large lease holdings in fast-disappearing Terrebonne Parish, warned that more environmental regulation would send the oil and gas sector off to "look for new places to explore."[109] Louisiana Land & Exploration Company, the largest independent oil producer in the United States, went one step further. As a rebuke to the CRCL citizens' plan, "Here Today and Gone Tomorrow," it launched a public relations campaign featuring a film, *Countdown on the Coast*, which roundly blamed the Army Corps of Engineers' Mississippi River levees for coastal erosion. Several experts were interviewed. No mention was made of the pipelines and canals.

However, the Coalition to Restore Coastal Louisiana managed to effect a series of state and federal laws that would eventually result in the passage of Act 6 by the Louisiana Legislature in 1989. The year before, Louisiana received federal recognition of its coastal wetland crisis when Congress authorized the Barataria-Terrebonne National Estuary Program (BTNEP) "for the purpose of protecting and restoring the 4.2 million acres of wetlands in the Barataria-Terrebonne estuary, one of the most ecologically productive and fastest disappearing landmasses on earth."[110] The BTNEP initiative created a conference of local stakeholders—local oystermen, fishermen, shrimpers, scientists, educators, citizens, environmental groups, and oil and gas interests—which produced fifty-one separate action steps to restore the local ecosystem.

It also provided momentum for the next plan: the 1990 Coastal Wetland Planning, Preservation, and Restoration Act (CWPPRA), which is colloquially known as the Breaux Act after its sponsor, then US senator John Breaux (D-LA). The act authorized $40 million a year for restoration projects and planning and called for the development of a comprehensive plan within three years—which resulted in the Louisiana Coastal Wetlands Restoration Plan in 1993. It called for a basin-by-basin planning approach within the nine hydraulic basins across the coastal area. The authors attributed 30 percent of the land losses to natural causes and 70 percent to man-made activities such as oil and gas extraction, saying that these activities may have triggered fault movements, as well as river levees, canals, and spoil banks and invasive species such as nutrias—all of which change the hydrology of the marsh.[111] While the funds were relatively modest, the Breaux Act codified that the state's wetlands were disappearing, and it was largely industry's fault. It also is credited with establishing a multiagency task force to begin restoration actions, which would continue to be the model going forward.

Basin teams nominated projects that were selected by a task force. The CWPPRA also provided a monitoring program for the first twenty years of each project. The initiative resulted in two large-scale freshwater reintroductions at Caernarvon and Davis Pond. The act was originally funded from small engine fuel taxes from the Highway Trust Fund. Its funding was reauthorized four separate times, but it was having little impact on Louisiana's coast. Modeling forecasted that the CWPPRA would prevent less than 20 percent of land loss by 2050 and that the state should expect to lose more than 600,000 acres of wetlands in fifty years.[112] While the CWPPRA had been intended to provide a comprehensive approach to restoration, it lacked region-wide strategies for better integration and for technical and policy review.[113] The projects under the CWPPRA, which succeeded in "preserving, creating or restoring 75,000 acres by end of decade,"[114] represented a proverbial finger in the dike. Louisiana needed a comprehensive plan.[115]

In the late 1990s, Chip Groat, who ran the Center for Coastal Energy and Environmental Resources at LSU, which was friendly with the petroleum industry, urged more big-picture solutions. What would be needed was not only a government-legislative response but also advocacy groups for wetland protection and restoration and a financial commitment on a massive scale. In 1996, Governor Foster committed to add state general funds to the coastal restoration trust fund to match all available federal funds. Mark Davis, director of the CRCL, wrote to Senator Breaux in 1997 that the CWPPRA lacked a clear vision of what kind of restored coastline it would produce and lacked a clear strategy for getting there. The state Department of Natural Resources and the Corps of Engineers disagreed on which agency would have control over contracts and project designs for the CWPPRA. Other issues included property rights disputes, interagency squabbling, and permit and construction delays. Meanwhile, the oystermen filed a precedent-setting lawsuit against the State of Louisiana over economic damages created by the Caernarvon freshwater diversion project because of a desalinization effect on their seeding grounds. This foregrounded political dissension in the master planning diversion projects a decade later.

An outside panel led by Donald Boesch from the University of Maryland found that the CWPPRA did not have enough broad-based support. They published a report titled "Scientific Assessment of Coastal Wetland Loss, Restoration and Management in Louisiana" that argued for balancing private land rights with greater public interests.[116] And in 1999, a study of a barrier island restoration was projecting land loss into the future even with all the proposed Breaux Act projects being implemented. In response, a CWPPRA task force of federal agencies and the State of Louisiana sponsored an eighteen-month study conducted by members of academia, private industry, and local, state, and federal agencies to develop a strategic plan to save the Louisiana coast, which culminated in "Coast 2050: Toward a Sustainable Coastal Louisiana" in 1998.

The "Coast 2050" plan outlined an ecosystem view of restoration and environmental management for what would be needed to maintain "essential ecological processes" over the next fifty years. Rather than a project-specific approach, it considered what the system needed to be sustainable. It recognized Gagliano's "environmental blueprint" for the coast, which called for a defensive and offensive approach, suggesting that some areas were not restorable. "Coast 2050" laid out the consensus of geologic research that most of the land in coastal Louisiana was built by deltas of the Mississippi River or by Mississippi River sediments entering the coastal mud stream. Barrier islands and sandy shorelines developed as waves, and coastal currents eroded and reworked sediments to build beaches and barrier islands. Maintaining the landscape required these and other processes. Soil-building processes would be vital to maintaining the system.

"Coast 2050" was also the first coastal restoration plan to anticipate the role of sea level rise on the coastal delta. Natural processes of sediment compaction and gradual sea level rise, it argued, submerge marsh plants and swamp forests, unless the soil can build up to compensate and maintain a high enough elevation for plants and trees to survive.[117] The plan took direct aim not only at river levees but also at canals that provided water access to drilling sites and their associated spoil banks: "Navigation channels and canals dredged for oil and gas extraction have dramatically altered the hydrology of the coastal area. North-south channels and canals brought saltwater into fresh marshes where the salinity and sulfides killed the vegetation. Canals also increased tidal processes that impacted the marsh by increasing erosion. East- west canals impeded sheet flow, ponded water on the marsh, and led to stress and eventual loss. Jetties at the mouth of the Mississippi River directed sediment into deep waters of the gulf."[118]

The plan specifically called for cutting gaps into spoil banks to release entrapped water, and it included Gagliano's Third Delta Conveyance Channel from Donaldsonville to Barataria to create a third delta. All twenty parishes in the coastal region adopted resolutions supporting the plan. The report priced what it considered a sufficient restoration program at a tenfold increase in the funding provided by the Breaux Act. "Coast 2050" outlined seventy-seven restoration strategies needed to protect 449,250 acres of coastal wetlands. In addition, it established that the natural geomorphic and ecological processes that had created the coast were impaired and that reestablishment of these processes was essential. "Coast 2050" contained two important differences from previous coastal planning efforts in Louisiana. It focused on meeting strategic goals rather than listing projects, and it took a regional view of the interventions that were needed.

The Coalition to Restore Coastal Louisiana, meanwhile, was lobbying for federal support to help pay for the plan's estimated $14 billion price tag. The organization created a national network, called "Restore America's Estuaries," to advocate for national wetlands recognition with the goal of restoring one million acres of estuarine habitat, half of which would be in Louisiana. And they explicitly urged the passage of "Coast 2050." In 2000, the coalition published a companion report, "No Time to Lose," that framed the loss of Louisiana's wetlands as an economic loss to the nation.

Once adopted by the Louisiana Legislature, "Coast 2050" required a massive infusion of funding. The state pinned its efforts to a long-standing grievance with the federal government on offshore federal royalty collections from oil. Louisiana lawmakers for years had argued that they were shouldering most of the burden of pipeline infrastructure without fair compensation. The state has also had a long-standing objection to the boundary line that the federal government has recognized since the 1930s.[119] Louisiana claims that its boundary line begins out at its barrier islands, but the court disagreed: "The Case established the boundaries of Texas and Florida at three marine leagues (10.3 geographic miles) off of their respective coastlines, while limiting the boundaries of Louisiana, Mississippi, and Alabama to only three geographical miles."[120] The court refused to draw the state's 1812 boundary starting at the barrier islands, essentially ignoring the state's unique geography. Through the 1970s and 1980s, the state lost a string of cases.

There are nearly two hundred Outer Continental Shelf pipelines that come ashore through canals and a half-dozen navigation channels built through the coastal marshes.[121] US senator Mary Landrieu (D-LA), who was friendly with the energy industry, targeted federal royalty collections. Landrieu introduced the Conservation and Reinvestment Act (CARA) of 1999. She argued that Louisiana had supported 90 percent of offshore development in the Gulf for more than fifty years and benefited from decades of economic activity but had "not received appropriate compensation for the use of its land and the environmental impacts of this production."[122] While the state received a 50-50 royalty share on oil and gas extraction within its legal boundary, it received a tiny portion of royalties between 3 and 6 miles offshore and virtually nothing beyond the 6-mile range, where most oil and gas activity in the Gulf of Mexico has taken place for decades.[123] "These areas and their fragile environments in Louisiana were sacrificed long ago for the benefit of industry investment and development," Landrieu said. "I intend to ensure that these areas will be ignored no longer."[124] The act would have boosted Louisiana's annual share of offshore revenues to about $200 million for fifteen years. Jack Caldwell of the Department of Natural Resources cited the Houma Navigation Channel as an example of a federal waterway built mainly to service the OCS that caused erosion of several square miles of land in south Terrebonne Parish over three decades. "In addition, the Louisiana coast is crisscrossed by 14,000 miles of pipelines," he said.[125] In the past, Louisiana's energy lobby had steadfastly denied the long-term impacts from dredging and drilling. But CARA did not increase royalties paid by the industry. It instead asked for a larger share of existing collections. With CARA, Louisiana was not claiming new boundary recognition but rather compensation for local costs of providing a national good.

Congressional support for the bill, however, began to wane in early 2000. Anti-drilling proponents believed that revenue sharing might stimulate additional offshore drilling. In a scathing letter, Robert Szabo, a Louisiana lobbyist, wrote to the US Senate Committee on Natural Resources, "Let me state clearly that the foundation for this bill has been, from the very beginning, Louisiana's need to restore our coast due to its unique value both to the nation and our state." He further declared that energy production from the federal OCS had generated "substantial costs" of environmental damages and infrastructure expenditures "that are either not being addressed or are being funded by the State of Louisiana and our parish governments."[126] In spring 2000, Congress took up the legislation along with an environmental bill for Florida's Everglades called the Comprehensive Everglades Restoration Plan (CERP), which was a twenty-year, $7.8 billion federal request.[127] Landrieu's amendment failed and with it a federal partnership. But Florida's bill passed. A pair of Louisiana coastal planners attributed Florida's success to a "linchpin issue" that bound disparate groups behind a common message and shared commitment. Florida's linchpin issue rested on the municipal water supply for South Florida's 20 million people. Louisiana's linchpin issue was different. "While the loss of so much physical habitat would be dire, environmental concerns alone are not sufficient to warrant the billions needed for comprehensive restoration," the planners said.[128] So how to convince Congress that Louisiana's coast—similar to Florida's coast in terms of size, rate of disappearance, and ecological inventory—was important?

Between the 1780s and 1980s, Florida and Louisiana each lost about 46 percent of their wetland acreage, or 9.3 and 7.4 million acres, respectively.[129] The authors lauded Florida's success in assembling the necessary stakeholders to publicize its erosion problem to win federal money. They questioned how Louisiana could create an identity for itself commensurate with the Everglades. Louisiana's wetlands, they said, lacked an identity. Florida's success was traced to its social infrastructure, political will, and history of activism that had begun in the 1920s. In 1994, the state had established the Governor's Commission for Sustainable South Florida, a panel of prominent industry and environmental leaders that built the political infrastructure for Everglades restoration.[130] Two years later, Congress passed the 1996 Water Resources Development Act (WRDA), which authorized the Army Corps of Engineers and the State of Florida to reevaluate a midcentury Corps project to provide water and flood control for cities and farms in southern and central Florida. This reevaluation led to the development of the Comprehensive Everglades Restoration Program (CERP) under the subsequent water resources act in 2000. Its primary goal was to return the hydrology of the Everglades to a more "natural" pattern. The $7.8 billion authorized under the plan was added to $3.2 billion already dedicated to Everglades restoration efforts since 1983. The new CERP contained more than sixty project features and was projected to create 217,000 acres of new reservoirs and wetlands.[131] When Everglades environmental activism was starting up in the early twentieth century, Louisiana was opening its wetlands to oil and gas development. "In 1923, seismic exploration technology was introduced to the region, and a decade later the LCZ (Louisiana Coastal Zone) was bustling with exploration and production."[132] After the Great Mississippi Flood of 1927, Congress directed the Corps of Engineers to construct a fortified and fully contiguous levee system along the Lower Mississippi River, which effectively cut off all sediment distribution from Louisiana's marshes. "Louisiana's appeal for restoration funding will be predicated on a host of concerns, but the linchpin issues are likely to be fisheries and petroleum infrastructure," the authors wrote. While half of the Everglades are in a national park, most of the Louisiana wetlands support commercial enterprises. "The relevant question is: *Can Louisiana convince the national interest that a 'working coast' is worth saving?*"[133]

Jim Trip of the EDF, who in the 1980s had helped form the CRCL, which ultimately led to "Coast 2050," suggested coastal advocates approach his old friend and prep school classmate, the New Orleans banker King Milling, who had deep roots in Louisiana landownership and oil and gas interests.[134] Milling was the president of Whitney Bank. Tripp and Mark Davis, the new head of CRCL, with a background in real estate development, appealed to Milling on his own terms. Whitney Bank's "collateral" of oil and gas infrastructure was disappearing into the sea.[135] Milling soon became the public face for the coalition and Louisiana coastal restoration writ large. Houck writes, "He spoke well, looked the part, and was patently sincere. He saw no conflict between saving his coast and protecting his industry. They were one and the same thing."[136]

GREENWASHING AMERICA'S WETLAND

In 2001, Republican governor Mike Foster formed the Committee on the Future of Coastal Louisiana, which in February 2002 submitted its report, "Saving Coastal Louisiana: A National Treasure, Recommendations for Implementing an Expanded Coastal Restoration Program." Milling chaired the new Governor's Advisory Commission. Also in 2001, Governor Foster organized a major coastal summit in Baton Rouge. At it, Milling declared the cost of coastal erosion should be told in dollars, commercial impact, and cultural values. "Oil and gas platforms and facilities, including pipelines[,] . . . will have to be either rebuilt or totally replaced," he said. On August 27, 2002, Governor Foster announced a campaign to increase national awareness of the state's dramatic coastal land loss: America's WETLAND: Campaign to Save Coastal Louisiana. It was funded by a $3 million donation from Shell Corp. "Although the entire nation depends on Louisiana's coastal wetlands for its energy production, seafood harvest, leading port system and wildlife habitat, very few people know they even exist," said Foster.[137] Milling became the spokesman for America's WETLAND Foundation. "He stated his conviction early and often: coastal stakeholders needed to form a new band of brothers and fight towards a common objective: securing federal (public) funding to restore the zone," Houck writes.[138]

What followed was an organized, industry-led public relations campaign. America's WETLAND partnered with Marmillion & Co., a national strategic communications firm led by a Louisiana native. A media buy was committed by TIME for KIDS to "develop educational and youth-focused materials." An educational video premiered at the 2002 Southern Governor's Association Conference in New Orleans stressing the importance of America's wetlands to the nation's energy and economic security.[139] Two days after the governor's presentation, Tripp's Environmental Defense Fund praised the America's WETLAND campaign as an important step toward "informing Americans about the value of vast but threatened coastal wetlands created by the Mississippi River." The effort to restore the coast would focus squarely on river sediment and the past practices of the US Army Corps of Engineers to levee the river, not on curtailing commercial or oil activity in the marsh itself. "Instead of being dumped off the continental shelf, river sediment should be diverted and used to rebuild wetlands," Tripp said in EDF's release. "We support the Governor's efforts to raise awareness about the plight of the wetlands and the federal funding needed to develop and implement a comprehensive, science-based restoration plan."[140]

Tripp and EDF recruited the National Wildlife Federation and the National Audubon Society to the campaign.[141] America's WETLAND sponsored international wetland science summits, organized congressional briefings, and recruited corporate sponsors. A successful campaign, they said, "will require that Louisianans speak with a unified voice and exhibit a strong commitment to paying the state's share of restoration costs."[142] At an early commission meeting in 2003, Tripp announced that "the environmental community and the energy industry must be partners as one part of creating the political will" for coastal restoration. The president of Shell Chemical echoed, "We must realize that we have been part of the problem and that we can be part of the solution." Essentially, oil and gas would fund the America's WETLAND Foundation campaign.[143]

The WETLAND group focused its energies through a campaign called "America's Energy Coast," which issued a publication called "A Region at Risk" on the nation's vulnerable energy infrastructure. The main highway to reach Port Fourchon—a major hub at the edge of the Louisiana coast that services offshore energy platforms—was vulnerable to environmental threats. "If broken by storms, floods or further erosion, it can disrupt the flow of goods and services that are the key to fueling America."[144] Senator Landrieu said, "When we lose resources so vital to our national security, it's as if we're under attack. We should respond accordingly. We would not allow a foreign power to threaten our land without a fight. Therefore, we should not allow a less obvious, but equally threatening power to take our land away."[145]

The campaign was intended to appear as a grassroots movement that would convince Congress to increase Louisiana's share of federal royalties from offshore wells. But perhaps even more important, the campaign also aimed to expand the OCS exploration to pay for coastal restoration. That would require lifting a twenty-five-year moratorium on drilling that had protected 90 percent of the OCS. As late as April 2005, Landrieu was publicly vowing to expand drilling and get a better royalty deal with the federal government. At the time, current law generally gave producing states 27 percent of revenues from production 3 to 6 miles offshore, which had to be shared equally with all states hosting pipelines, while revenues from drilling farther out went entirely to the federal Treasury. Jason Theriot explains, "The talking points for Louisiana politicians and coastal advocates had clearly shifted from solely protecting environmental resources to preserving the coast for America's energy and economic needs."[146]

As gas prices started to rise in 2005, Landrieu tried again to revive CARA. But her effort stalled after the George W. Bush administration balked at giving up federal royalties and environmentalists joined with Florida officials to oppose opening the OCS. But later that summer in 2005 something else happened: Hurricane Katrina made landfall.