

Manipulating the Landscape

*No place in America
fights Mother Nature
the way New Orleans does.*

—Chris Erskine, 2007

Bienville's Dilemma
A Historical Geography of New Orleans
by Richard Campanella

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Agriculture in the Colonial Era

Two Frenchmen, an Englishman, and a Spaniard describe the late 17th-century colonial agricultural economy

“The men who [settled] Biloxi Bay in 1699,” wrote Nancy Surrey in her 1916 treatise on commerce in French colonial Louisiana, “were interested chiefly in mining and trading, with scarcely even a secondary interest in agriculture.”²⁸⁰ Precious minerals proved to be non-existent in Louisiana, and colonists’ ensuing efforts to export pearls, buffalo hides, dried fish, and other sundries also fell short of expectations. With the hope of quick riches fading, Louisiana’s destiny as an agricultural colony became apparent, albeit greatly hindered by a paucity of labor. France had to import sustenance to keep the colony alive in its first few years—not quite the relationship the mother country had envisioned.

A sequence of events in the late 1710s advanced Louisiana agriculture to a second level. In 1716, the Crown, exasperated with the granting of too much land to too few colonists, issued an edict delineating fertile lands into narrow “long lot” plantations and distributing them to a greater number of planters (see *Antecedent Cadasters, Antecedent Axes*). In 1718, Bienville founded a riverside port and courier-office—New Orleans—that would, in time, serve as the premier transshipment point for crops raised on those plantations. In 1719, in response to the labor shortage, French colonials imported the first African slaves to Louisiana. Agricultural productivity would rely on the toil of enslaved men and women of African descent for the next 143 years. At roughly the same time, the first major wave of Europeans arrived to Louisiana, among them hard-working German and Swiss farmers who settled the nearby *Côte des Allemands* and proceeded to cultivate crucial food crops for the colony.

With the basic components of an agricultural economy in place, the 1720s witnessed Louisiana exports expand from raw materials such as peltry, lumber, pitch, and tar, to include tobacco, indigo, and rice.²⁸¹ Those three crops, plus grain and garden vegetables, predominated along the lower Mississippi throughout the colonial era.



A generation later, four colonial officials—two Frenchmen, an Englishman, and a Spaniard—documented Louisiana’s growing agricultural landscape and trade economy, complete with the spins and biases of the day.

An anonymous French officer, displeased with the state of New Orleans (see *Passing Judgment on New Orleans Society*), described in 1744 an agriculture- and for-

estry-based frontier exchange economy involving commodities and supplies moving among France, Caribbean colonies, and Indians in the interior:

We trade at present with the Americans, to whom for their stuffs and rum we [give] chiefly peas and beans, which are very rare [in the French West Indies]; we also supply them with timber for building ships. To the merchants who bring stuffs, cloth, wine, brandy, liquors, arms, and meal from France, we give in exchange tobacco, rice, *mahis* [maize], cotton, indigo, skins, pine wood, cypresses, cedar, log wood, pitch, tar, or pitch-trees, [which are] paper bills having no currency but in the colony.

Lastly, we supply the savages [Indians] with fusils [flintlock muskets], powder, shot, knives, needles, razors, vermilion, woollen [sic], ribbons, blankets, skirts, blue and red cloth, and I hardly... for which we get skins of wild animals, kids, furs, beavers, venison, or wild fowl....²⁸²

Frenchman Michel de la Rouvière, the commissary at New Orleans, described in September 1722 the “present situation of the colony in regard to its settlements, its products, and its commerce” to his superior in France, Minister Antoine Louis Bouillé. Michel’s report provides a view of French Louisiana’s modestly expanding agricultural production as well as New Orleans’ emerging role in France’s New World trade economy:

The [Crown’s] vessels came very late this year. This caused all kinds of merchandise to be scarce and expensive here. [The price] declined upon the arrival of these vessels, which came, fifteen in number, almost together.

Ships loaded and unloaded Campeche wood (dark heart wood from the logwood tree of Campeche, Mexico, used to extract a purple dye), “timber of all sorts and in abundance; tobacco in the form of snuff and twist... [and] indigo,] and many more peltries than in the preceding [years], since more of them have come down than usual from the Illinois [country] and the Choctaws.”

“The harvests of rice and corn will be rather beautiful in the interior of the colony,” he predicted.

Indigo will not yield so much because of the abundant rains.... The Illinois [country] has furnished much flint [sic] enough has already come down to supply all the posts on the way, and even the Natchitoches.... The plantations of wax trees that several individuals have made in the interior of the colony were astonishingly productive last winter. Sieur Dubreuil... alone has made at least six thousand pounds of this wax... and several have gone into the woods by the sea to gather it from the wild trees of this species. The public here uses no other material at all to furnish it light, and commerce has profited by a part of it for France and for America.

Michel is describing bayberry trees, also known as wax myrtles, whose berries yield a yellow-green wax when exposed over hot water. Early New Orleans was a major regional producer and exporter of candle wax made from this native coastal Louisiana

tree. Planters also experimented successfully with cotton: wrote Michel, “I have seen some...cotton I found to be splendid,” though, “together with the seeds, [t]hey are rather difficult to detach.” The same Dubreuil who produced wax also attempted to solve the cotton ginning problem: “Sieur Dubreuil has just constructed a wheel that by means of two cylinders of copper, iron, or hard wood, joined together and turning one over the other like those of sugar mills, detaches these seeds quickly enough to make it possible to profit from it in commerce.” (Claude Joseph Villars Dubreuil, a noted builder responsible for the current Old Ursuline Convent, operated a sawmill powered by diverted river water at the present-day foot of Elysian Fields Avenue. Perhaps this was the site where Dubreuil designed his cotton gin. Successful or not, it would take another forty years for a mechanical cotton engine to transform plantation agriculture in the South—and New Orleans’ destiny.) On the overall climate for plantation agriculture in Louisiana, Michel gushed:

All the other products grow perfectly. All the seasons are perfectly distinct. Each one makes itself felt as it ought to. The climate is splendid. The summer is, to tell the truth, a little too warm and stormy, but that is exactly the time when the river is high.

Flood water struck Michel not as a liability, but an asset: “One can dispose of its waters as one wishes without trouble or expense and at the same time...waters and...enriches one’s land with the mud that the water leaves on it.” Michel was equally upbeat about urban New Orleans:

The settlers...have come out of their lethargy. They are all asking for negroes and really cannot succeed without them. Things are moving along very well. The colony is growing every day by itself. It is necessary, so to speak, only to spur it on. In the three years that I have been here about forty fine houses of brick have been built in New Orleans; several fine plantations have been organized and perfectly established; several sawmills and a number of settlers have been placed on new lands where they are living rather wretchedly while waiting for some negro workers who can help them to develop and clear them. Some...have sent me money...to have some negroes brought from the Cape [Français].

Michel issued a three-part recommendation for the colony’s success: “send here good peasants, farmers, and decent people, and a supply of negroes”—and no bad soldiers, like those who recently proved to be “almost a total loss. The majority have already run away or died of drunkenness, of debauchery of all sorts, and of venereal diseases [and] scurvy...” Michel suggested recruiting settlers to Louisiana from the French islands of the Caribbean, especially of Martinique...“where they find themselves too cramped and limited for their plantations....”

Fitting a man dedicated to commercial development, Michel summarized that Louisiana “is, to tell the truth, my lord, the best land that there is in the world and the finest colony that the King could possess.”²⁸³

Two years later, war broke out between French and English colonial interests

in the territorially contested Ohio River Valley. The conflict spread worldwide in the late 1750s, increasing in both bloodshed and stakes. French forces in North America mostly succumbed by 1760 but fighting continued elsewhere for three more years. Foreseeing defeat, King Louis XV in 1762 secretly ceded France's claims west of the Mississippi, plus the "city" of New Orleans, to his Spanish cousin King Carlos III, in compensation for Spain's loss of its Florida possessions to the British. When France signed the Treaty of Paris in 1763, nearly all of the rest of French North America, including Louisiana east of the Mississippi as well as French Canada, became British territory. Francophone New Orleans not only lost its mother country for the unwanted Spanish dons, but gained an unwelcome new neighbor to north: British West Florida. English Captain Philip Pittman was among those new neighbors.

Pittman, deputed to survey his country's new lands, described New Orleans' geography and plantation agriculture in the late 1760s:

There are some plantations on the Bayou of St. John, and on [Bayou Foad] from thence to New Orleans. The settlements of the Gentilly are one mile from the Bayou [sic] of St. John, on the side of a small creek now-filled Bayou [Gentilly], which also communicates with the lake Pontchartrain.

[James Brulé, Chapitoulé, and the German settlements [Kenner, Harbigny, and Hahnville areas, respectively] join each other, and are a continuation of well cultivated plantations of near forty miles from New Orleans, on each side of the river....

The different articles [grown on these plantations] are indigo, cotton, rice, maiz, beans, myrtle wax-candles, and lumber. The indigo of this country is much esteemed for its beautiful colour and good quality; the colour is brighter than that which is fabricated at St. Domingo. The cotton, though of a most perfect white, is of a very short staple, and is therefore not in great request. The maiz, different sorts of beans, rice, and myrtle candles, are articles in constant demand in St. Domingo.

Some of the richest planters, since the year 1762, have begun the cultivation of sugar, and have erected mills for squeezing the canes; the sugar produced in this country is of a very fine quality, and some of the crops have been very large; but no dependence can be laid on this, as some years the winters are too cold, and kill the canes in the ground.²⁸

Agricultural production in Louisiana, most of which passed through New Orleans, increased markedly at the close of the French era. The colony exported 672,000 *livres'* worth of produce in 1755 and ten times that number in 1767 (6,662,000 *livres*), with tobacco accounting for the lion's share.²⁸⁵

By the 1770s, plantation agriculture dominated the lower Mississippi River landscape. Francisco Boulinny, a Spanish officer advising the Crown on Louisiana affairs, witnessed the growth of the colony during 1769 to 1775. While "the first ten leagues [thirty miles] upon entering the river are uninhabitable," he wrote, "after them both banks of the river are cleared and cultivated up to Manchac," near Baton Rouge.

This means about 175 river miles on both sides of the Mississippi, to 2,000 feet depth on either side, were in agricultural production, with livestock grazing on pasture behind the plantations and timber harvested from the woods behind the pastures. Bouligny then described how the plantations were delineated:

Land is measured by river frontage, and all these lands, or most of them, belong to various individuals according to their abilities. But as a rule... they have 500 to 600 *varas* of river frontage, with 7,400 in depth. This is the usual concession; but beyond this distance, as the interior of the lands is not inhabitable, the concession is usually augmented in depth.²⁸⁶

Bouligny is describing the French custom (encoded in the 1766 edict) of delineating long lots perpendicular to river, measured by the unit *arpent*. Bouligny, a Spaniard, translated *arpent* to Spanish unit *vara*, which equates to about 2.8 English feet. Early Louisiana long lots typically ran four to ten *arpents* in frontage by forty in depth, which generally align with Bouligny's estimates. Where the river meanders and the natural levee stretches farther back, long lots spanned in depth to eighty arpents or more. Names for canals, levees, or streets reflecting the so-called "forty arpent line" or "Eighty Arpent Line" are still found throughout southern Louisiana today, a relic of colonial-era plantation agriculture.

Bouligny's description of the emerging elite planter class, and its dependence on institutionalized African slavery, foretells the agriculturally based aristocracy that would dominate Louisiana and New Orleans for much of the upcoming century:

In all the countries of the world, the men who dedicate themselves to the cultivation of the soil are generally more day-laborers.... On the contrary, in Louisiana there reigns a noble and proud vanity, because the greatest praise that can be made of a boy is to call him a good planter, that is, a man intelligent in the toils of the field.²⁸⁷

The majority of the planters who live [around] New Orleans are the most decent people.... Many of them are former officers from the time of the French;] others are merchants who, having gained a certain well-being, have employed it in buying Negroes and a piece of land. [This] provides them with the ease to increase their capital.... They gather frequently to eat with their neighbors; and their conversations are always directed to the state of the harvest.... Each one has a gang of Negroes according to his ability, and the wealth of each one is measured by naming the Negroes he has.²⁸⁸

Events forthcoming in the new American century would augment the "reign" of the "noble and proud" planter class, and help make the lower Mississippi River plantation region home to one of the nation's highest concentrations of millionaires. They would also subject thousands of Africans—to whom Bouligny referenced in the off-handed manner usually reserved for mere objects—to decades of enslavement on those lucrative lands.



Agriculture in the American Era

Sugar and cotton transform the South—and New Orleans

A sequence of events around the turn of the nineteenth century utterly transformed Louisiana agriculture, and launched New Orleans into the world economy. First, in 1791, a slave rebellion destabilized the extremely profitable French sugar island of Saint-Domingue. Troops sent by Napoleon failed to overcome insurgents on a yellow river, and by 1804 the colony declared independence as Haiti. The loss diminished Napoleon's interest in the costly and cumbersome Louisiana colony, which he viewed as little more than a granary for Saint-Domingue. Wary of over-extending his colonial empire, in need of money, and in light of impending war, Napoleon decided to sell the entire Louisiana territory to the United States. Suddenly, New Orleans, for decades the orphan of two declining, distant Old World colonial empires, now found itself strategically positioned to prosper under the dominion of an ascendant, unabashedly capitalistic New World democracy. River commerce, once controlled by individuals purchasing the rights of monopoly from the king of Spain, in which “wealth circulated in a very partial manner,” now fell under “the American commercial system... of toleration and competition,” which “diffuses [wealth] to all around.” Anglo-American settlers arrived in droves to Louisiana—some to New Orleans to work as merchants, others to the lower Mississippi Valley as planters. “The influx of American speculators was so great” after the Louisiana Purchase, wrote a disapproving but nevertheless impressed Thomas Ashe in 1809, “that the character of commerce instantaneously changed, and violence and competition, which in America means contention, reigned triumphantly...” The number of merchants in New Orleans, he wrote, increased fifty-fold in six years.²⁸⁹

As these geopolitical events unfolded, three agriculturally related technological breakthroughs transpired over twenty years. In 1793 Eli Whitney invented the cotton engine, or “gin,” which dramatically improved the separation of cotton lint from seed. In time, cotton cultivation spread into newly cleared Mississippi Valley lands mostly north of Baton Rouge. Two years later, Jean Etienne de Boré of New Orleans succeeded in granulating sugar cane locally—a process practiced for centuries in the tropical West Indies, but elusive in semi-tropical Louisiana—and replicated the success commercially. Serendipitously for Louisiana, the turmoil in Saint-Domingue decreased the supply of West Indian sugar and increased demand for new Louisiana cane just as many sugar-savvy Haitians arrived in New Orleans and helped launch a local sugar industry. Sugar cane cultivation swiftly replaced fading colonial-era crops throughout the lower Mississippi River region. “It is worthy of remark,” wrote one visitor in 1810, “that the plantations... from Natchez to New Orleans and still lower down, were formerly appropriated to the culture of indigo and rice, but the demand for these articles... being on

the decline, the attention of the planters is now turned to that of sugar and cotton, both of which [make] excellent shipments....”²⁹⁰ New Orleans served as the transshipment and marketing node, and later as processing center, for the region’s exploding sugar and cotton exports. The two commodities spectacularly increased port traffic. “The exportation of commerce in Louisiana, fifteen years ago, was carried on with thirty ships of moderate size,” wrote Frenchman Francois Marie Perin Du Lac in 1807 after visiting the region in 1801–02. “Since the cultivation of sugar and cotton, it has so increased, that above two hundred are employed.”²⁹¹

Finally, in 1812, the first Mississippi River steamboat docked at the city’s riverfront. After a few years of working out technological, logistical, and legal barriers (namely the ill-advised monopoly granted to inventors Robert Fulton and Robert Livingston, overruled by the Supreme Court in 1824), steam shipping rapidly antiquated slow-moving keelboat traffic to upriver destinations, providing efficient transportation for hinterland exports and exterior imports to reach New Orleans’ wharves.²⁹² Cotton ginning, sugar cultivation, and steamboat transportation also helped torench slavery in the region, and again, New Orleans was positioned to benefit—in the crassest commercial sense—becoming the busiest slave mart in the South.

“The products of Louisiana are already quite considerable,” wrote former National Geographic Society director Pierre Clément de Laussat later in life, as he described his memoirs of the Louisiana Purchase era. Laussat’s description of American agricultural expansion into the Mississippi Valley at that time, though ironically, hyperbolically indulges both grudging admiration for the new American nation and exasperation with Old World powers:

Wherever the Anglo-Americans settle, land is fertilized and progress is rapid. There is always a group of them who act as trailblazers, going... into the American wilderness ahead of the sealers.... They clear, populate it, and then push on again and again.... They set up their temporary shanties, fell and burn trees, kill the Indians or are killed by them, and disappear... either by death or by soon relinquishing to a more stable farmer....

When a score or so of such new colonies have congregated into one location, two printers arrive—one a federalist, the other an antifederalist—then the doctors, then the lawyers, and then the fortune seekers. They drink toasts, nominate a speaker, set up a town, and raise many children. Finally, they advertise the sale of vast tracts of land [and] exaggerate the population [to] form an independent state.... and so another star appears on the flag of the United States!

A district under the Spanish or French regime might begin, end, start again, get lost again, and so successively until its fate is sealed... Under the Anglo-Americans, a newly born state...keeps on growing and strengthening.²⁹³

That growth meant more shipments to New Orleans—where additional legions of Anglo-American merchants, as well as Creole and foreign businessmen, oversaw handling and transshipment to ocean-going vessels bound for world ports.

The turn of the nineteenth century thus saw New Orleans transform from an

isolated colony engaged in a regional-scale frontier exchange economy, to a key cog of a vast, export-driven Atlantic World economy. Out went colonial Louisiana's low-value, hither-and-thither exports, catalogued in 1791 as "indigo... skins of wild beasts, timber, lumber, planks, shingles, rice, tobacco, and corn...";²⁹⁴ in their place came vast, monocultural, slave-labor plantations of cotton and sugar—the former above Baton Rouge, the latter throughout the Louisiana deltaic plain southward to the sea. New Orleans' ensuing prosperity revolved around the financing, marketing, handling, storage, processing, and shipping of these two premier commodities.

Voyagers on the antebellum Mississippi witnessed the fruits of this agricultural productivity lining the river as well as floating down it. "In the whole distance to New Orleans, plantation touches plantation," marveled Timothy Flint in 1823: "I have seen in no part of the United States such a rich and highly cultivated tract.... Noble houses, sumptuous sugar-houses, neat summer-houses, and numerous negro villages succeed each other [like] one continued village.... [It is the] richest agricultural district in the Union."²⁹⁵ Wrote English geologist Charles Lyell as he sailed near Baton Rouge in the late winter of 1846, "A great many handsome country houses, belonging to the proprietors of sugar plantations, give a cultivated aspect to this region...."

[T]he scenery is enlivened by a prodigious number of schooners and large steamers sailing down from the Ohio and Red Rivers, heavily laden with cotton. This cotton has already been much compressed... but it undergoes, at New Orleans, still greater pressure, by steam power, to diminish its bulk before embarkation for Liverpool.

The captain calculated that within the first seven hours after we left [downtown New Orleans], we had passed not less than ten thousand bales going down the river... amounting to 350,000 dollars. All this merchandize would reach *the great emporium* within twenty hours.²⁹⁶

Much of the "great emporiums" professional class served as middlemen—agents, factors, lawyers, advisors, bankers, representatives—for wealthy planters. Each commodity spawned its own economic district within the city: the "Cotton District" formed around the intersection of Carondelet and Gravier streets, home to the Cotton Exchange and numerous factor offices; the "Sugar District" formed on the French Quarter levee around the foot of Bienville Street where the Sugar Exchange and industrial sugar refining facilities operated.

The Civil War radically disrupted New Orleans' agricultural dependency, but only temporarily. Within a year, operators began recruiting Chinese field hands out of Cuba and, later, Italians out of Sicily to replace emancipated slaves as labor sources in the sugar fields. (Their effort would inadvertently create a "China town" and a "Little Palermo" at opposite ends of downtown New Orleans.) With mostly low-paid black labor, cotton and sugar agriculture remained fundamental to the city's economy well into the twentieth century.

A series of factors dethroned King Cotton and its Crescent City retainers in the 1910s-30s, among them federal regulations, foreign imports, railroad and truck-

ing competition with river transportation, and the westward shift of cotton cultivation to drier areas. Cotton acreage in Louisiana declined from almost two million acres in 1930 to a few hundred thousand in later decades. In New Orleans, the total number of cotton-related businesses listed in city directories declined from 152 in 1921 to 47 in 1945-46. Cotton factors, the quintessential power profession of antebellum times, declined from ninety-three in 1880, fifteen in 1921, and only one in 1949.²⁹⁷

The city's sugar industry suffered a similar fate. The new Chalmette Sugar Refinery moved the sugar processing industry from the French Quarter levee to semi-rural St. Bernard Parish in 1912. Disease, low yields, price drops, and foreign competition followed. Sugar factories (mills) in rural parishes diminished from 300 in 1900 to 54 in 1926. Louisiana's share of the national market fell from 11 percent around 1900 to 4.5 percent in 1937.²⁹⁸ In New Orleans' Sugar District, brokers, factors, and firms almost completely disappeared by the early 1920s. The state's sugar cane industry regained its footing by the 1950s, counting over 2,500 farms and forty-eight mills, but still subject to free trade, increased competition, dropping prices, rising costs, low yields, and uncooperative weather steadily eroded its status. By 2005, only 720 sugar cane farms and thirteen mills remained in operation statewide.²⁹⁹ Sugar cane cultivation remains a major part of southern Louisiana culture, but less and less so every year. A recent publication entitled *Delta Sugar*, by John B. Rehder, encapsulated the trend in its subtitle: "Louisiana's Vanishing Plantation Landscape."

Petroleum, shipping, and, now, the tourism and convention trade have long since supplanted the handling of early American-era agricultural commodities as the city's premier calling. Yet the modern cityscape is replete with their influences, from cotton factors' offices in the CBD, to sugar merchants' mansions in the Garden District to the immense U.S. Custom House on Canal Street—once among the largest government buildings in the nation, built to process receipts on the vast agricultural riches of the Mississippi Valley as they passed through the Queen City of the South.

Constraining and Controlling the River

The blessings and curses of levee construction on the Mississippi

Springtime river floods quickly convinced French colonials in New Orleans that the natural *levée* (from *lever*, "to raise") provided insufficient protection from the Mississippi. The first organized effort to heighten and reinforce it began in 1722-23, when city engineers Le Blond de La Tour and Adrien de Pauger planned an earthen embankment about twelve feet wide reinforced with a double palisade of timbers. Original plans had to be scaled back because of an insufficient labor force and the death

of La Tour in late 1723. By 1724, the first levee measured six feet wide, 3000 feet long, and probably three feet high, but was readily breached by the high waters of the Mississippi that spring. Three years later, a solid eighteen-foot-wide and three-foot-high levee (plus a parallel ditch to collect seepage) lined one mile of the town's riverfront. For manpower, the city at first obligated slave owners to assign their bondsmen thirty days' labor on public works, then adopted a tax instead.

Throughout the French colonial era, "extension of the levee line [beyond the city] was almost entirely the work of private land developers supervised at the local level—first by commandants, then by parish and county governments."³⁰⁰ By 1752, riverfront levees extended twelve miles below New Orleans to thirty miles above it; by 1757, the bays spanned twenty miles below the city to thirty miles upriver, and advanced in that direction by about one mile per year.³⁰¹

The tradition of localism continued under the Spanish, as each concession recipient bore the responsibility of levee construction, drainage ditch excavation, and road clearing. Le Page du Pratz, who resided in New Orleans from its founding to the 1730s and published his *History of Louisiana* in 1758, wrote:

On [both] banks of the river runs a causey, or male [road] following crest of a levee] from the English Reach quite to the town, and about ten leagues beyond it; which makes about fifteen or sixteen leagues on each side the river; and which may be travelled in a coach or horseback, on the bottom as smooth as a table.³⁰²

A league measuring 2.5 to three miles, Le Page estimates generally concur with those of an English captain who visited New Orleans in the late 1760s:

The Leveé . . . extends from the *Detour des Anglois* [English Turn], to the upper settlement of the Germans, which is a distance of more than fifty miles, [with] a good coach-road all the way. The Leveé before the town is repaired at the public expense, [but] each inhabitant keeps that part in repair which is opposite to his own plantation.³⁰³

No integral flood-control infrastructure can be decentralized and "outsourced" to individuals in this manner. Failure of any one landowner to install and maintain properly his portion of the levee would compromise the entire system. An early attempt at centralized oversight came with Spanish Governor Carondelet's levee ordinance of 1792, which required vindicated residents to raise levees to the recent high-water mark of the river, while reinforcing their sides by filling in ditches and planting grass to conserve the soil. Livestock grazing was strictly forbidden, and in the most vulnerable places, "the owner will have to have at all times a deposit of pickets, planks, Spanish moss and other articles necessary to stop the crevasses under penalty of a fine of one hundred piastres."³⁰⁴

A weak federal government and rural isolation allowed localism to continue under American dominion. In New Orleans, the City Council gradually gained control over the waterfront and set standards (1810) for levee construction: at least three feet above the river at normal stage, one foot above high-water line, and five to six feet wide

at the base for each foot in height. The effort at this time fell under the direction of City Engineer Jacques Tanese, who designed embankments that, unlike today's trapezoidal berms, faced the river with a wall of wooden pilings reinforced by an earthen backslope which doubled as a wharf. Levees in adjacent areas rarely conformed to those standards, thereby reducing the system's overall effectiveness to that of the weakest link.

Yet, as American expansion ensued, levees of varying standards expanded upstream at a rapid pace. Circa 1770 levees paralleled the river from English Turn, in to the German Coast; by 1822 they extended up the Old River; and by 1844 the dikes reached beyond Greenville, Mississippi.³⁰⁵ A visitor during 1819-21 described the region's "artificial embankment" as

thirty or forty yards from the natural bank of the river, four to six feet high, and six to nine feet broad at the base, [extending] 130 miles on the eastern, and about 170 on the western side of the river.... [I]t's preservation is secured by the obligation which the law imposes on every individual to maintain in good repair that part which is before his own land... enforced by commissioners who are appointed to inspect and direct repairs.³⁰⁶

Fifteen years later, Joseph Holt Ingraham described New Orleans' system in his travelogue, *The South-West by a Yankee*:

[The levee] extends, on both sides of the river, to more than one hundred and fifty miles above New-Orleans. This levee is properly a dike, thrown up on the verge of the river, from twenty-five to thirty feet in breadth, and two feet higher than high-water mark; leaving a ditch, or fosse, on the inner side, of equal breadth, from which the earth to form the levee is taken. Consequently... when the river is full... the surface of the river will be *four feet higher* than the surface of the country.³⁰⁷

Disaster inspired reform in flood-control policy. A crevasse in the levee of Pierre Sauvé's Jefferson Parish plantation on May 3, 1849 flooded over 200 blocks in New Orleans, by filling up the backswamp and inundating the city from the rear. Sauvé's Crevasse ranked as the city's worst flood until Katrina in 2005 (see "*May Heaven Avert Another Such Catastrophe!*"), and forced the federal government to consider its role in overseeing lower Mississippi River flood control. Washington responded by offering federally owned swamplands to states in the Mississippi Valley in exchange for their commitment to build levees, drain the swamps, sell the land, and recoup their investment. The Swamp and Overflow Land Act of 1850 spurred more levee construction, but fell short of expectations. Also at this time, the federal government engaged in matters of the navigability and control of the Mississippi by funding two landmark (and competing) surveys. One was led by Andrew Atkinson Humphreys, which would recommend a "levees-only" policy to control the Mississippi; the other, by Charles Ellet, suggested a comprehensive approach that included levees to constrain the river, and outlets and reservoirs to accommodate it. Humphrey's research would lead to increased federal involvement in levee development later in the century (and to great reconsideration in the wake of the 1927 flood, when the wisdom of Ellet's research

proved true).³⁰⁸

The state also entered the picture. In 1854, the Louisiana state legislature formed four flood districts and a Board of Swamp Land Commissioners to oversee levee development. In time, this entity would evolve into the "levee district," a consortium of governmental bodies that manages levee work and possesses the power to levy taxes.³⁰⁹ The age of localism was ending. But then war clouds gathered, derailing progress for over a decade. Miles of existing levees in Louisiana deteriorated during the Civil War.

Flood control came of age in the civil engineering era of the late nineteenth century. Locally, city engineers in New Orleans proposed in 1871 an integrated system of protection levees and urban drainage networks, though full execution would take another generation. Statewide, in 1886, Louisiana created levee districts to begin coordinating levee maintenance efforts. Most significantly, at the national level, Congress created the Mississippi River Commission in 1879 and directed it to work with the Army Corps of Engineers in controlling the lower Mississippi. With the Commission "offering advice, serving as a clearing house for technical data, and providing two-thirds of the funding required for construction, levees in Louisiana reached a new level of sophistication."³¹⁰ In 1890, the state created the Orleans Levee District and the Board of Levee Commissioners, charging them with the "construction, repair, control and maintenance of all levees in the District, whether on river, lake, canal or elsewhere...."³¹¹ By 1892, a half-million cubic yards of soil went into the construction of five miles of new levees and the reinforcement of twenty-four existing miles. Over a million more cubic yards were added to the city's levees in 1892-96. In 1907, earth-moving machines were introduced, reducing construction costs by half while speeding work and improving quality. By the late 1920s, the Orleans Levee Board's workers had moved an additional fifteen million cubic yards of soil to the New Orleans riverfront levees in accordance with the exacting standards of the Mississippi River Commission.³¹²

While the massive earthen walls arising around New Orleans gave its citizens a sense of security, the emphasis on levees alone as the defense against floods—the "levees only" policy advocated by Humphreys and others, including the public, since the mid-1830s—backfired during the Great Flood of 1927. Levees are critical to the control of a river but, without backup mechanisms, they raise the river's level and power and then worsen the chances and consequences of a crevasse. In other words, they alleviate the annual nuisance of minor flooding but increase the risk of an occasional catastrophic deluge. Levees also sever the annual replenishment of sediment and freshwater that the river historically imparted to the deltaic plain.

The 1927 deluge flood inspired quick passage of the Flood Control Act, which cemented the federal government's financial responsibility for flood engineering commitment to, a massively augmented Mississippi River flood control system. Immense alteration of the Mississippi valley's physical and human geography was forthcoming: levees would be raised, broadened, strengthened, and extended; floodways, spillways, and runoff channels were to be excavated; reservoirs, locks, dams, weirs, and other structures would be installed. The changes, mostly executed in the 1930s-60s, radically affected millions of people, where and how they lived, and how they perceived their

environmental security or risk. The tradeoff: the Flood Control Act also specified that the government would not be liable for losses should those flood-control systems fail.

Locally, as a result of the Flood Control Act of 1928, levees were realigned, reinforced, and raised, creating the earthen berms Louisianians know today. Backing up the traditional levee control of the river were the Bonnet Carré and Morganza spillways, built to accommodate the will of the Mississippi by providing “safety values” to divert dangerously high water into adjacent water bodies. No major Mississippi River levee breaches have occurred in the New Orleans metropolitan area since 1927.

Until recently, the Orleans Parish Levee Board maintained, according to the design grades of the U.S. Army Corps of Engineers, twenty-eight miles of levees and seawalls and seventy-three floodgates along the Mississippi River, plus another 101 miles of levees and 107 floodgates along Lake Pontchartrain and the navigation and outfall canals.³¹³ While the latter failed infamously during Hurricane Katrina in 2005, exposing engineering flaws at Army Corps and leading to the unification of parish levee boards, the other front levees succeeded in keeping a twelve-foot-above-normal gulf surge flowing up the Mississippi from pouring into New Orleans. This provided little comfort to the tens of thousands of homeowners who flooded because of canal levee breaches—failures for which, according to the 1928 Flood Control Act, the government was not liable.³¹⁴

The control of the Mississippi River, an effort spanning three regimes and nearly three centuries, represents one of humanity’s grandest manipulations of a natural system. It has rendered nearly as many blessings—productive croplands, a livable New Orleans, a society flourishing on a bountiful deltaic plain—as it has curses: coastal erosion, subsidence, salt-water intrusion, ecological decline, and levee-dependent land development schemes that lure settlers into hazardous flood plains. Spatially, the effort resolved the threat of Mississippi River flooding to New Orleans proper—only to transfer that threat to the rising, encroaching Gulf of Mexico. Temporally, it succeeded in preventing frequent minor floods—but increased the chances of an occasional mega-catastrophe.

Levees, in short, both enable and endanger human life—a classic Louisiana dilemma.

Scoring and Scouring the Land

The benefits and costs of canal excavation in a delicate environment

Why score and scour thin, delicate soils and invite dangerous water bodies into the heart of a bowl-shaped metropolis? That question perplexed many outside observers as the Katrina saga played out in the late summer of 2005. Motivations for canal

excavation that seemed rational in the past now bear greater scrutiny.

Pressure to improve access between the Mississippi River and Lake Pontchartrain inspired canal plans as early as 1718. One proposal appeared on what may be the earliest city plat, *Plan de la Ville de la Nouvelle Orléans projetée en Mars 1721*. Technologically too ambitious for the era, the envisioned canal never passed the conceptual stage. Nor did Gov. Périer's suggestion in 1727 to dig a channel from city limits to Bayou St. John. Most waterway excavation in early colonial times took the form of minor ditches for draining runoff from muddy streets, which residents crossed on raised sidewalks (*banquettes*) and wooden bridges.

Around 1750, Claude Joseph Villars Dabreuil directed his slaves to excavate a river-diversion canal to power a *moulin à poutches* (sawmill) on a plantation immediately below New Orleans. That project, later called the Marigny Canal, eventually influenced the cartilinearity of Elysian Fields Avenue when the Faubourg Marigny was laid out in 1803. Despite the potential danger of provoking a crevasse, diverting the river for hydrological energy was not uncommon in colonial times. English Capt. James Pulteney reported in 1770 that "many of the planters" near New Orleans "have saw-mills, which are worked by the waters of the Mississippi in the time of the floods, and [go] day and night till the waters fall."³¹⁵ The practice continued into the American years. Wrote Francesco Cuming in 1810, "a number of mill races [have been] cut through the levee. On these races saw mills are erected for sawing plank, boards for building houses, and others for making sugar boxes . . . exported to the Hayannah."³¹⁶

Canal excavation for transportation promised far more profit than those dug for energy. New Orleanians in the late 1700s still relied on ancient Bayou Road to reach Bayou St. John and Lake Pontchartrain, limiting cargo and passenger movement between city and lake. Spanish Gov. Hector Carondelet addressed this problem in 1794 by directing the excavation of a canal to the bayou, an idea first broached by Governor Périer almost seventy years earlier. The initial narrow ditch, used for drainage, would be widened for schooners and lined with tree-lined *banquettes*, providing a promenade for citizens as well as freight access to the lake.³¹⁷ Completed by 1796 at a width of fifteen French feet, and later privatized and widened in the early American years, the Carondelet Canal developed into a key commercial waterway for "cotton, tobacco, lumber, wood, lime, brick, tar, pitch, bark, sand, oysters, marketing . . . furs and peltries,"³¹⁸ while also serving to drain runoff from city streets. Appreciative citizens "erected a monument . . . in the English, French, and Spanish languages, purporting, that, 'This canal was designed, planned, and executed by the Baron de Carondelet, for the convenience of the city.'³¹⁹ Maj. Amos Stoddard described the waterway in 1812:

This canal rises in a basin . . . sufficiently capacious to accommodate several small vessels. It extends in a direct line about two miles to St. John's creek, and is about twenty feet wide. This is of great advantage to the city, particularly as the products of the lake and back country, such as fish, lime, tar, [and] pitch . . . find a easy water access to the inhabitants, whereby a difficult and expensive cartage of three miles [on Bayou Road] is avoided.³²⁰

The waterway gave the city access to lakeshore and coastal trade as well as to

the piney-woods regions behind them. When a flatboat navigated successfully in 1824 from the wild headwaters of the Pearl River in central Mississippi all the way to the Carondelet Canal's turning basin, it was hailed as "a new and interesting experiment in the inland commerce of this country [which] will lead to events of incalculable benefit to the trade of New Orleans."³²¹ A contributor to the *New York Times* later remarked on the bustling spectacle of that turning basin, located immediately behind the city at present-day Basin and Orleans Streets:

The commerce of Carondelet Canal... is annually increasing[;] a large trade is carried on with the river and seaboard towns of Alabama, Mississippi, Florida, &c.... The large fleet of briggs, schooners, sloops, and steamers, which come up to the city in the rear, at once strikes the attention of the stranger, and he wonders how the vessels ever got up... into the heart of the city.³²²

Anglo-American businessmen in the upper city responded to the lower (predominantly Creole) city's successful canal project, as well as its recent Pontchartrain Railroad, by planning their own city-to-lake waterway. The New Orleans Canal and Banking Company invested four million dollars in 1831 to excavate a channel to the lake, measuring sixty feet wide, accommodating six-foot draft vessels, lined with a levee and a paved toll road, and terminating in a turning basin near Julia Street's present-day intersection with Loyola Avenue. For labor, the company recruited poor Irish "ditchers," who died by the thousands from disease and brutal work conditions.

The New Orleans Canal, completed in 1838 and nicknamed the New Basin Canal to distinguish it from the Carondelet ("Old Basin") Canal, soon proved a success. The waterway brought to the inner city a steady stream of sand, gravel, and shell for fill; lumber, firewood, and charcoal; fruits, vegetables, cotton, and seafood; and myriad other cargo from the lake and coast. For navigation canals, their adjacent shells roads, and the Pontchartrain Railroad all helped connect New Orleans with its neighbors while circumventing slow and costly trips across the land or down the river. "The citizens seem *determined* to avoid the one hundred and ten miles of river navigation," wrote one visitor in 1832, when two of these projects were under development.³²³ That observation encapsulates much of the motivation for the scoring and scouring of the New Orleans landscape.

Drainage explains most of the rest. The Old and New Basin canals were joined by a series of drainage ("outfall") canals excavated in the 1870s as part of the emerging municipal drainage system, which came to fruition at the turn of the twentieth century. Unlike earlier gravity-fed drainage ditches, massive pumps propelled rainwater through these wider waterways and into adjacent water bodies. Because they had to be lined with levees, the drainage canals formed new hydrological sub-basins in the lakeside marshes, because they bisected the ever-so-slight topography of the natural basins with severe and sudden barriers. The 17th Street, Orleans, London Avenue, and other later drainage canals (some open, others covered) escorted unwanted rainwater out of the topographic bowl, but also allowed a channel of lake water to sit within and above the bowl, a few feet from the newly developing residential neighborhoods. This is usually not a

problem, so long as the levees hold.

Competition among ports motivated city leaders in the 1910s to advocate streamlining navigation routes and creating new dock space off the river. The vision soon evolved into the "Inner Harbor Navigation Canal." A committee organized in 1918 identified various benefits that the so-called "Industrial Canal" would bring to New Orleans: the creation of ship building sites within a protected, fixed-level harbor; the development of new water frontage that could be privately held (river frontage in New Orleans was traditionally held in the public trust); the creation of space for new facilities to handle, store, and transport cargo, and the extension of the Intracoastal Canal.³²⁴

In May 1918, the corridor for the canal was selected—a 5.3-mile-long swath with a 1600-foot-wide right-of-way located roughly two miles downriver and parallel to Elysian Field Avenue (where, incidentally, a similar canal was foreseen ninety years earlier). The selected corridor boasted definite advantages, being (1) within Orleans Parish limits; (2) across a relatively narrow land strip between river and lake; (3) mostly undeveloped; (4) convenient to existing shipping lanes and port activity; and (5) either city-owned or readily acquirable. Its riverside half followed a tract owned by the Ursuline Nuns since 1821 (plus adjacent Convent Street and some nearby blocks), which the nuns, "[w]ith exceptional generosity,"³²⁵ donated to the city in 1911. The orientation of the nuns' property and the surrounding street network in the Ninth Ward (present-day Bywater and Holy Cross neighborhoods) determined the northeasterly orientation of the lower portion of the Industrial Canal; once the corridor got past the developed area along the natural levee, designers dog-legged the path in a northwesterly direction to achieve a shorter route to the lake. Thus physical, historical, economic and political geography all played roles in siting the Industrial Canal.

With the Dock Board in charge and the renowned George W. Goethals Company as consulting engineers, ground was broken on June 6, 1918. Digging a major canal through a swamp connecting a powerful river and a bay of the Gulf of Mexico presented numerous engineering challenges. For one, levees had to be built along the excavation, to prevent flooding of the lowlands. A lock was necessary, because the tidally influenced lake lay only inches above the sea while the river flowed anywhere from one to twenty feet above that level. Turning basins were needed to accommodate larger vessels.

Dredges had to enter the dig site via the lake and Bayou Bienvenue because boring in directly from the Mississippi was too risky. Preventing water-logged soils from sliding into the excavation proved challenging, while occasional cypress trunks embedded in the muck jammed the suction dredges and slowed progress.³²⁶ The recently installed drainage system at Florida Walk had to be siphoned beneath the canal, and existing railroads had to be rerouted. At one point, the Dock Board decided to double the bed size from the lock to the lake, requiring further excavation. With labor gangs, mechanized excavators, pile drivers, dredges, dynamite and other implements, the city's largest single-site construction project to date refined the geography of metropolitan region.

As the main channel reached completion in September 1919, attention turned

to the great lock.³²⁷ Located about 2,000 feet in from the Mississippi, the lock measured 640 feet long, only 74 feet wide, and 50 feet deep. The five-gate motorized device raised and lowered vessels between the average-ten-foot-high river and the sea-level lake. An engineering landmark, the lock ranked among the largest in the nation at the time and lay upon soils far less stable than any previous project of this type.

Envisioned for over two centuries, New Orleans finally accomplished its dream of connecting lake and river on January 29, 1923. Eight days later, the fire tug *Samsen* carried Gov. John M. Parker and distinguished guests through the lock, opening the canal for navigation.³²⁸ At the May 5, 1923 dedication ceremony of the Industrial Canal, Governor Parker declared that the waterway would “equip New Orleans to be, in the broadest sense, the gateway of the Mississippi Valley for its interchange of products with the markets of the world.”³²⁹

Soon after its completion, the Dock Board adapted the canal into an inner harbor accommodating not just the passage of vessels but their docking and loading needs. Among the new features was the six-block-long shrouded Galvez Street Wharf, added in 1924. The modification reflected the sentiment that the dispersed, end-to-end nature of the old river wharves would someday necessitate the development of compact, economical dock space somewhere other than the Mississippi. Excavation of the Intra-coastal Waterway (“ICWW” 1940s), a barge route running through protected waters from Texas to Florida, furthered that vision. The ICWW, jutting through cypress swamps eastwardly from the Industrial Canal, gave metropolitan New Orleans another waterway access route to gulf waters.

The Industrial Canal played an important role in the city’s World War II effort. The Florida Avenue Wharf opened to handle increased business: legendary shipbuilder Andrew Jackson Higgins built LCM tank-converters, FS ships, and PT boats at a sprawling facility near Geniville Boulevard; and the Army Quartermaster Corps (1919), at the river end of the canal, served as the Port of Embarkation for troops departing for the front lines.

For the port and navigation interests, the Industrial Canal proved a success. For St. Bernard Parish and many Ninth Ward residents, the waterway severed them from the urban core (see *How the Poor Third B came the Lower Ninth*), inconvenienced their daily commutes, and lowered their property values. For the metropolis in general, the canal dangerously introduced adjacent water bodies into the urban heart, and necessitated the erection of new levees and flood walls along areas that had subsided below sea level. The adjacent ICWW formed another gulf-connected waterway, its guide levee potentially funneling surges into the Industrial Canal and yards away from people’s homes.

Still more pressure for efficient navigation access came from the shipping industry. As the vision for the Industrial Canal arose with World War I on the horizon, the idea to connect the Industrial Canal (and thence the river) directly with the Gulf of Mexico via a “Mississippi River-Gulf Outlet Canal,” later dubbed MR-GO, originated when war clouds gathered again in the early 1940s. Local government authorities and business leaders met with the U.S. Army Corps of Engineers in 1943 and agreed that a tidewater canal would put New Orleans and the Mississippi Valley’s vast inland-

waterway network back in competition with routes that utilized the Panama Canal for east-west shipping. Participants disagreed, however, on the route of the seaway: some advocated an east-bank path from the Industrial Canal to the Gulf of Mexico; others favored a west-bank route from Intracoastal Canal to Grand Isle.

The war delayed the plan until the late 1940s, when local leaders and politicians in Washington made headway promoting the project. Funding was lost, however, when Sen. Russell Long withdrew an amendment that would have authorized \$67 million for the project when he sensed that opposition from advocates of the competing St. Lawrence Seaway would ruin the effort. Similar legislation met the same fate twice again, by 1953. "Apparently upper Mississippi Valley supporters of the Louisiana seaway were more interested in the St. Lawrence seaway, which New Orleans opposed, and withdrew their votes until the St. Lawrence project passed Congress," wrote historian Gary Bolding. "After Congressional approval of the St. Lawrence seaway in 1954, opposition to the New Orleans project faded."³³⁰ A bill for New Orleans seaway finally passed and was signed into law by President Eisenhower on March 29, 1956.

The first phase of the project (1958-59) altered twenty million cubic yards of local topography and bathymetry by enlarging the ICWV between the Industrial Canal and Paris Road. Phase two (1959-61) dredged a narrow access channel from the ICWV to the Breton Sound, affecting twenty-seven million cubic yards in St. Bernard Parish. The third and fourth phases (1960-65 and finalized in 1968) enlarged this access channel, from Paris Road to the -38-foot bathymetric contour in the Gulf of Mexico, an excavation of 225,000,000 cubic yards of saline marsh. Spoil was accumulated on a 4000-foot-long guide levee paralleling the lower MR-GO in St. Bernard Parish, while spoil from the excavation of the spacious turning basin in New Orleans (at the point where the Industrial Canal, MR-GO, and ICWV all intersect) went to shore up the area now occupied by the Jordan Road terminal.³³¹

The completed MR-GO channel, measured 50 feet deep and 500 feet wide in its inland stretch, and slightly larger in its offshore portion. It eliminated 37 shipping miles between New Orleans and the open gulf, and provided ample opportunities for dockside development within the port of New Orleans. "Sailing time, ship turnaround time, navigation hazards, and congestion all tend to be reduced by the [MR-GO]," reported the Army Corps of Engineers.³³²

Nevertheless, the MR-GO fell short of economic expectations. While annual traffic on the seaway averaged 7,193,000 tons of freight in 1984-93, tonnage declined steadily in the 1990s, accounting for 11 percent of port activity in 1990 and only 5 percent in 1998.³³³ The project failed to draw the wharves and dockside facilities away from the Mississippi to become the CENTROPOR that was envisioned in the 1970s. At that time, observers predicted that the Mississippi would be in "grave" of port facilities by 2000. Instead, by the millennium, the vision and the trend had decidedly reversed back to the historical circumstance of riverside wharves. Recognizing the difficulty of large container ships in navigating the MR-GO to dock in the Industrial Canal, the Dock Board decided to create a "mega-wharf" by combining and expanding the uptown river terminals at Napoleon and Nashville Avenues. The sophisticated new uptown container wharf, coupled with worsening delays on the narrow and shallow eastern navigation

canals, effectively shifted the fulcrum of port activity back to the Mississippi by the early 2000s. The MR-GO remained open for a few shipping interests.

Environmentally, the MR-GO ranks among the region's—or rather, the federal government's—worst mistakes. The project destroyed 8,000 acres of wetlands during its inception, subsequently caused severe coastal erosion and salt-water intrusion, and permanently forged a minimum friction pathway for gulf storm surges to enter the metropolis. During hurricanes Katrina and Rita in 2005 (not to mention Betsy in 1955), guide levees along the Y-shaped junction of the Intracoastal Waterway and MR-GO “funneled” an eighteen-foot-high surge into the Industrial Canal, raising the level and speed of the current. Levees along all three navigation canals either were overtopped, disintegrated, or in the case of the Industrial Canal, breached catastrophically at the expense of many lives. It was not the first time that a man-made navigation exacerbated a disaster. In 1871, a breach on the New Basin Canal levee allowed high Indian Pontchartrain water, fed by a Mississippi River crevasse at Bonnet Carré, to inundate the four portions of the Second, Third, and Fourth wards. The Bonnet Carré Flood ranked as the city's second-worst deluge until 2005.³³⁴

It took hundreds of lives in St. Bernard Parish, the Lower Ninth Ward, and New Orleans East to convince the Army Corps and other key authorities that the MR-GO must be closed. As of late 2007, congressional authorization for the waterway's partial closure is in place, but funding appropriation is not. Closure can mean any number of things: the Corps currently envisions deauthorizing the waterway from the Intracoastal Waterway junction to the gulf, and constructing a twelve-hundred-wide, seven-foot-above-sea-level rock dike across the channel at Bayou La Loutre, a project that would cost \$217 million and take about six months. Literally filling the channel would have cost nearly three billion dollars, taken decades to complete, and required over one-third of a trillion cubic yards of sediment to fill only half of the MR-GO—a disquieting commentary on just how much environmental havoc the project wreaked.³³⁵ Meanwhile, terminal operations formerly dependent on the MR-GO connection to the Industrial Canal (which itself was silted-up by Katrina's surge and remains bottlenecked by a narrow lock) are relocating back to the natural banks of the Mississippi, where their predecessors did business since 1718. Environmental historians today consider the MR-GO a poster child for NEPA legislation (passed a few years after the canal was completed), which subjects federal projects to far more rigorous environmental-impact analysis.

Retrospection obligates us to recall the historical context in which these ill-fated decisions were made. City authorities in times past rightfully worried about the diminishing importance of the Mississippi River, due to Northern canal excavation, railroad construction, industrial development, and other challenges to New Orleans' transportation advantage (see *Lessons in Over-Reliance*). Given limited levels of ecological and geological understanding, they responded in a rational way—by answering the competition with canals and seaways of their own. The public and private sectors thus scored, scoured, and scarred the delicate soils of the New Orleans region because the near-term need for drainage, navigation, and resource extraction seemed more pressing than theoretical storm surges and coastal erosion seemed threatening. The effort, until recently, hardly even rose to the level of an acknowledged dilemma: authorities gener-

ally viewed such projects as purely advantageous until they proved to be partially lethal. Little deliberation or reflection appears in the historical records of these decisions.

Now we know better. It is hoped that no major canal or seaway will ever be dug in or around New Orleans again, while existing waterways whose costs outweigh their benefits will be gated and, if possible, closed. Reversing two centuries of canal excavation is the order for the next century.



A Trip Across the Backswamp

Eye-witness descriptions of New Orleans's now-disappeared marshes and swamps

[B]eyond the city... all is level as the ocean, with the dark woods growing gray in the distance, then blue, and fainter blue, as they vanish over the rim of the world.³³⁶

—John Mitchell, describing the backswamp
from the roof of the Custom House in 1758

While riverside New Orleans in the 1820s bustled with population and commerce, those dark, gray and rather ominous expanses by Lake Pontchartrain lay mostly vacant and wild. Impenetrable bamboo-like reeds covered the lakeshore's thin spongy soils, while myriad inlets and minor bays intersected the salt grasses and terminated in lakeside shell banks and detritus. Further inland, cut-over cypress forests offered an equally foreboding environment. Few reasons compelled New-Orleansians even to visit, let alone live amid, the marsh and backswamp near the Lake Pontchartrain shore.

Across the lake and eastward to the Gulf Coast, however, lucrative commercial opportunities beckoned. The growing metropolis needed lumber, tar, bricks, firewood, game, and other raw materials from the pine woods of the Florida Parishes, its citizens wanted quick and comfortable access to Biloxi, Mobile, Pensacola, and beyond. Bayou St. John, Carondelet Canal, and their adjacent shell roads—the only passages across the marsh at the time—left much to be desired for both cargo and passenger travel. A visitor from Mobile in 1828 typified the experience of confused travelers arriving to New Orleans from the Gulf Coast in that era:

We landed at a place called, I think, the Piquets [probably Spanish Fort, along the Lake Pontchartrain shore], about six or seven miles from New Orleans.... This short distance we passed over on a road slitting a sluggish Creek [Bayou St. John] running in the midst of a swamp overgrown with cypress and others, misty trees, rising out of a thick, rank underwood.³³⁷

A slow, bumpy carriage through a threatening swamp made for a sorry ingress and

gress to a city destined for greatness. There had to be a better way.

A group of lower-bourgeois businessmen that same year endeavored to solve this problem with an exciting new transportation technology: railroad. The men formed a company in 1829, won a state charter in 1830, gained rights to a direct, unobstructed, five-mile route connecting river and lake, and commenced work clearing the track bed. On April 27, 1831, the horse-drawn Pontchartrain Railroad made its inaugural run. Six stage-coach-like cars bearing state and local dignitaries, a band, and the company stockholders

moved in the most imposing manner to the sound of music amidst a large concourse of admiring spectators, who lined each side of the road, and reached the lake by happy coincidence at the moment the Mobile steambot arrived for the first time at Port Pontchartrain with the mail. The mail and passengers were immediately forwarded to the city... and reached the head of the road in half an hour.³³⁸

The Pontchartrain Railroad became the first railroad west of the Appalachians, and first in the nation to complete its track system. Seventeen months later, it introduced steam rail locomotion to the city, “to the great admiration and wonder of a vast concourse of our citizens, who were assembled... to witness this novel and interesting sight.”³³⁹

Pickety and primitive as the line was (Abraham Oakley Hall called it in 1847 a “relic from the infantile days of the art of steam propulsion,” and its locomotive “one thousand mosquito power”³⁴⁰), the Pontchartrain Railroad had a significant impact on the economics and geography of the lower city. It gave New Orleanians, for the first time, thirty-minute access to the lakefront. It bolstered numerous enterprises needing cargo moved northward or eastward. It also transformed Elysian Fields Avenue into a wide, straight, and ever-lengthening thoroughfare. Thousands of passengers arriving to New Orleans after 1831 sailed not up the Mississippi to the world-renown riverfront levee of New Orleans—its “front door”—but through the Figolets channel to tiny Milneburg (present-day Elysian Fields intersection with Jean C. Simon), where, sometimes confused and disoriented, they boarded “Smokey Mary” and rode down Elysian Fields through the city’s “back door.” Among these visitors were presidents, dignitaries, celebrities, illustrious names of the day—and travel memoirists, usually from the Northeast or Europe, who toured the nation’s major cities with pen in hand. Some left behind rich descriptions of the trip across the backswamp.

One of the first visitors to describe the Pontchartrain Railroad and the Elysian Fields landscape was Joseph Holt Ingraham around 1833-34. “Its advantages to New Orleans are incalculable,” he wrote: the line represented “an avenue of wealth” on which “a great trade is carried on with Mobile and other places along the Florida coast... with safety and rapidity.”³⁴¹ He paid six “bits” for the round-trip passage to Milneburg and boarded the eight-to-ten-car train (which, incidentally, was segregated by race) at an elongated station at the foot of Elysian Fields. With the clanging of a bell, “our fiery leader moved forward, smoking like a race-horse, slowly and steadily at first—then, faster and faster, till we flew along the track with breathless rapidity.” Ingraham then

observed the physical landscape, embracing the widespread nineteenth-century view of the natural world as a threatening and foreboding place:

The rail-road, commencing at the Levée, runs for the first half mile through the centre of a broad street, with low detached houses on either side. A mile from the Levee we had left the city and all dwellings behind us [near the North Claiborne intersection], and were flying through the fenceless, uninhabited marshes, where nothing meets the eye but dwarf trees, rank, luxuriant undergrowth, tall coarse grass, and vines twisting and winding their long, serpentine folds around the trunks of the trees like huge, loathsome water-snakes. By the watch, we passed a mile-stone every three minutes and a half, and in less than nineteen minutes, arrived at the lake. Here, quite a village of handsome, white-painted hotels, cafés, dwellings, store-houses and bathing-booms [Milneburg] burst at once upon our view; running past them, we gradually lessened our speed, and finally came to a full stop on the pier.... The pier, constructed of piles and firmly planked over, was lined with sloops and schooners, which were taking in and discharging cargo, giving quite a bustling, business-like air to this infant port. Boys, ragged negroes, and gentlemen amateurs, were fishing in great numbers farthest out in the lake, others were engaged in the delicate amusement of cray-fishing, while on the right the water was all the while with bathers....³⁴

After brushing shoulders with French- and English-speaking locals raising a ruckus at Milneburg's smok'd-filled cafés and billiard halls, Ingraham recorded. Alas, the return trip did not go so smoothly: somewhere between the Genilly Ridge and the city, the locomotive struck and completely severed a cow.

In 1839, the Englishman James Silk Buckingham arrived from Mobile to Port Pontchartrain and boarded the train through "a perfect swamp or morass... with impenetrable woods and thickets on either side" for the half-hour journey to New Orleans. He was more attuned to the cultural landscape than the physical one. Here he describes the Faubourg Marigny:

The avenue by which we entered the city was called Les Champs Elysées; and every thing that caught our attention reminded us strongly of Paris. The lanterns were hung from the centre of coaches passing across the streets, as in France; women were seen walking unbonneted, with gay aprons and caps; the names of all the streets and places we passed were French; the café-keepers, porters, and hackney-coachmen spoke chiefly French; the shop-signs, gateways, pavements, and passengers moving in the streets, all seemed so perfectly Parisian, that if a person could be transported here suddenly, without knowing the locality, it would be difficult for him to persuade himself that he was not in some city of France.³⁵

The English geologist Charles Lyell arrived by a Lake Pontchartrain steamer on Mardi Gras 1846, and traveled the Pontchartrain Railroad bound for the St. Charles Hotel. The train

conveyed us in less than an hour to the great city, passing over swamps in which the tall cypress, hung with Spanish moss, was flourishing, and below

it numerous shrubs just bursting into leaf. In many gardens of the suburbs, the almond and peach trees were in full blossom[;] the blue-leaved palmetto, and the leaves of a species of iris... were very abundant. We saw a tavern called the "Elysian Fields Coffee House," and some others with French inscriptions. There were also many houses with porte-cochères, high roofs, and vases, and many lamps suspended from ropes attached to tall posts on each side of the road, as in the French capital. We might indeed have fancied that we were approaching Paris, but for the negroes and mulattos, and the large verandahs reminding us that the windows required protection from the sun's heat. It was a pleasure to hear the French language spoken....³⁴⁴

During his tour of the South in 1853-54, a disoriented Frederick Law Olmsted encountered a substantially more developed and deforested environment along Elysian Fields Avenue:

There were many small buildings near the jetty, erected on piles over the water—batting-houses, bowling-alleys, and billiard-rooms, with other indications of a place of holiday resort—and, on reaching the shore, I found a slumbering village. [Then] a locomotive backed, screaming hoarsely, down the jetty; and I returned to get my seat.

[I] have puffed, past the restaurant... through the little village of white houses... and away into a dense, gray cypress forest. For three or four rods [about 100 feet], each side of the track, the trees had all been felled and removed, leaving a dreary strip of swamp, covered with stumps.... So it continued, for two or three miles, then the ground became dryer [Cantilly Ridge], there was an abrupt termination of the gray wood; the bog was lifted up, disclosing a flat country, skirted still, and finally bounded in the background, with the swamp-forest [near present-day Interstate 610 intersection]. A few low houses, one story high, all having verandahs before them, were scattered thinly over the...

At length, a broad road struck [by the side of the track established portion of Elysian Fields Avenue]; the houses became more frequent; soon forming a village street, with smoke ascending from breakfast fires; windows and doors opening, maids sweeping steps, bulkers' wagons passing, and broad streets, little built upon, breaking off at right angles....

I asked the name of the village [Vaujour de Richny], for my geography was at fault. I had expected to be landed at New Orleans by the boat, and had not been informed of the railroad arrangements and had no idea in what part of Louisiana we might be....

There was a sign, "*Café de Vaujour*," and, putting my head out of the window, I saw that we must have arrived at New Orleans. We reached the terminus, which was surrounded with *fiacres* [hackney cabs waiting at the foot of Elysian Fields] in the style of Paris. "To the Hotel St. Charles," I said to a driver....³⁴⁵

William Howard Russell, a correspondent from London who covered the

South's secession from the Union, arrived to Confederate New Orleans a month after the bombardment of Fort Sumter in 1861. His trip on a steamer from Mobile attested to the times: rumors flew about armed cruisers from the United States threatening Southern coastal positions; armed men in uniform eyed the vessel as it steamed past Biloxi-area beaches; some military men on board nearly came to blows over an argument; and "a thin, fiery-eyed little woman... expressed a fervid desire for bits of "Old Abe"—his ear, his hair; [either] for the purpose of eating or as curious relics..." Continued Russell:

At night the steamer entered a dismal canal [Rigolets channel], through a swamp which is infamous as the most mosquito haunted place along the infested shore... When I woke up at daylight, I found the vessel lying along side a wharf with a railway train along side, which is to take us to the city of New Orleans...

A village of restaurants or "restaurants," as they are called here, and of bathing boxes has grown up around the terminus [Milneburg]; all the names of the owners, the notices and sign-boards being French. Outside the settlement the railroad passes through a swamp, like an Indian jungle, through which the overflowings of the Mississippi creep in black currents. The spires of New Orleans rise above the underwood and semi-tropical vegetation of this swamp. Nearer to the city lies a marshy plain in which flocks of cattle, up to the belly in the soft earth are floundering among the clumps of vegetation. [We approached] a suburb of exceedingly broad lanes [lower Elysian Fields Avenue through Faubourg Marigny], lined on each side by rows of miserable mean one-storied houses, inhabited... by a miserable and sickly population.³⁴⁶

By the time of Russell's visit, the Pontchartrain Railroad's heyday was beginning to pass. In the late 1850s, new railroads such as the New Orleans, Mobile and Chattanooga line connected the city directly with the Gulf Coast, leaving only lake traffic to the Pontchartrain. No longer would dignitaries descend Elysian Fields Avenue from points worldwide; increasingly, the Pontchartrain Railroad primarily served day trippers to Milneburg, which became more of a resort and less of a port.

In 1880, a half-century after its formation, the Pontchartrain Railroad was acquired by the Louisville & Nashville Railroad Company. James S. Zachary, using the unmistakable cadence of a modern-day tour guide, described the circa-1885 Elysian Fields landscape to tourists seeking the picturesque and the interesting—a far cry from the culturally exotic and physically threatening environment reported by his predecessors:

Leaving the city, the road goes direct to the lake in a straight line, four miles, which is the narrowest point between the lake and river. Via Livingston square, with the Third Presbyterian Church (on left) at Good Children street (on right) Shell Beach R.P. depot to Lake Borgne. At the Gentilly Ridge (on left), a Jewish cemetery; passing through old fortifications erected in 1862, and the swamp, Milneburg is reached, a small village named after Alexander Milne, a benevolent old Scotchman. This village is composed of a se-

ries of restaurants and bathing houses. At the end of the long pier is a light house....³⁴⁷

Note that Zacharie makes only fleeting reference to the once-vast and threatening backswamp.

Urbanization continued to expand northward up Elysian Fields Avenue. New rail lines, streetcars, canals, roads, and later automobiles enabled easy access to the lake. An urban railroad that formed a valued asset in the early nineteenth century became a noisy urban nuisance in the early twentieth century. Protesting neighbors played their part in the demise of the Pontchartrain Railroad, but it was direct-line railways, automobiles, and buses that sealed its fate.

In 1930, the Louisville & Nashville Railroad Company, which kept the Pontchartrain running solely to maintain its franchise on the route, began divesting itself of the century-old line. "Abandonment of the railroad will remove the last barrier in the way of a proposed thoroughfare from the Mississippi River to Lake Pontchartrain via Elysian Fields Avenue,"³⁴⁸ predicted the *Times-Picayune* that year. Also in 1930, the Midrebourg entertainment district, where generations of New Orleansians recreated and where great jazz musicians played, closed to make way for the seawall and lakefront project. On March 15, 1932, after 101 years of service, "Smolky Mary" made her last run down the Pontchartrain Railroad. Tracks on Elysian Fields Avenue were removed partially in 1935 and entirely in 1954. By that time, the adjacent backswamp had been cleared, drained, platted, developed, and populated.

Elysian Fields Avenue today lacks the mansions, oak canopies, clanging streetcars, and Mardi Gras parades that bring fame and iconic status to St. Charles Avenue. Its only claims to fame are its cameos in Tennessee Williams' *Streetcar Named Desire* and Walker Percy's *The Moviegoer*, earned more for its convenient metaphorical implications than as a real place. But to thousands of people a century and a half ago, Elysian Fields Avenue formed the back door to the Queen of the South, and a rare first-hand experience across the storied New Orleans backswamp.

"Drained Dry and Covered with Gardene Homes"

The history and consequences of municipal drainage

Distributaries, tidal flats, and runoff flowing off the Mississippi's natural levee rendered the flat lake-side flanks of Orleans Parish a vast wetland, wooded with cypress in some parts and grassy with tidally influenced brackish water in others. The uninhabitable backswamp seemed to most New Orleansians to produce little more than miasmas, mosquitoes, and mud, while inhibiting urban growth and travel. Residents

and visitors dreaded the hydric landscape, anthropomorphizing it as ugly and evil (see *The Topography of Ooze*). Efforts to neutralize this perceived threat through hydrological engineering antedated most of the growth spurts of the expanding metropolis.

Colonial-era attempts at drainage involved ditches dug around city blocks to feed a makeshift network of outflow canals, over which wooden bridges and raised sidewalks (*banquettes*, a term still heard today) were built for pedestrians. In 1794, Spanish Governor Carondelet had prisoners and slaves excavate a canal at the rear of the city for drainage and navigation to Bayou St. John. "Carondelet Canal" scored the cityscape for well over a century but hardly solved New Orleans' drainage problem. Likewise, the Moremene and Poydras canals dug in the American Sector, and the Marigny Canal on Elysian Fields Avenue, did little to dry the streets and drain the swamps.

By the late 1850s, engineers guided by a drainage plan envisioned by city surveyor Louis H. Pilié had built four steam-powered paddle wheels to push water through brick channels toward Lake Pontchartrain. The system fell into disrepair when war broke out. A more serious attempt occurred in 1871, when the Mississippi and Mexican Gulf Ship Canal Company dug thirty-six miles of drainage canals (precursors of the present-day 17th Street, Orleans, and London Avenue outfall canals, of Hurricane Katrina infamy) before it too went out of business. Failed private initiatives handed the formidable task back into municipal hands by the 1880s, at which time the city's inadequate system could only remove at most 1.5 inches of rain per day.

A public consensus, driven in part by uptown women of means, finally arose during the Progressive Era of the 1890s in support of a serious drainage effort. The New Orleans City Council responded in February 1893 by directing the Drainage Advisory Board to gather data and design a solution, funding it with \$700,000. No lethargic bureaucratic committee, the Drainage Advisory Board assembled "the best and the brightest in the city, "successful engineers, international experts on public health... men who believed New Orleans's history of inconclusive skirmishes with... nature could end in a rousing victory for the city."³⁴⁹

The engineers' findings, presented in January 1895, included a summary of past drainage attempts, a new large-scale topographic map, and fresh meteorological and hydrological data. Their proposed solution: use natural topography to drain runoff from within New Orleans' various hydrological sub-basins to low points therein, then install pumps to propel the water uphill through outfall canals and into adjacent lakes. A network of waterways of varying magnitudes would facilitate the intricate dendritic drainage system: Street gutters would collect surface flow and direct it into covered branch drains; branch drains would flow into main drains; main drains would flow into gravity-fed branch canals; branch canals would flow into a central main canal at the lowest spot in the city, where pumping stations would speed the draw of water into it. Another set of pumps would then propel the water uphill through the outflow canals (already in place since the 1870s) and finally into adjacent lakes Pontchartrain and Borgne.³⁵⁰

Construction, which began in 1896, received an additional boost in June 1899 when voters (including women, who had the suffrage in this special municipal-bond referendum and enthusiastically supported municipal improvement) overwhelmingly

approved a two-mill property tax to fund waterworks, sewerage, and drainage. This important moment in local democracy launched the Sewerage and Water Board of New Orleans, then and now the organization responsible for these Herculean tasks.

By 1905, workers completed forty miles of canals, hundreds of miles of pipelines and drains, and air pumps draining 22,000 acres with up to 5000 cubic feet per second (c.f.s.). This effort represented only 44 percent of the original plan, but it already transformed the landscape. Wrote George Washington Cable,

there is a celebrity that could not be when the mosquito swarmed everywhere—when the level of supersaturation in the soil was but two and half feet from the surface where now it is ten feet or more.... The curtains of swamp forest are totally gone. Their sites are drained dry and covered with miles of gardened homes.³⁵¹

A victim of its own success, the drainage system abetted urbanization and increased impermeable acreage and thus runoff, forcing in 1913 the Drainage Advisory Board to reconvene and expand the system—something that repeated throughout the early to mid-twentieth century. What originally comprised a “wet” drainage system, in which acres of open land absorbed a fair amount of runoff, gradually grew into a “dry system” incapable of storing the accumulation of sudden intense, intense rainfall, thus forcing up the pumping capacity and giving the system zero leeway in pumping that water out.

Among the board employees was a quiet young Tulane engineering graduate named Albert Baldwin Wood, a descender of the prominent Boudigny family. In 1912, Wood presented his design for a “screw pump,” an enormous impeller that would draw water out of the suction basin and into the discharge basin rapidly and efficiently. Eleven “Wood pumps” were installed by 1915; many are still in use today. The brilliant and modest Wood devoted his career to New Orleans’ drainage challenge; his patented Wood screw pumps were adopted in China, Egypt, India, and the Netherlands. While Wood is often credited with draining New Orleans, he actually made an existing system faster and more efficient.

New Orleans’ home-grown drainage technologies effectively neutralized the city’s age-old topographical and hydrological constraints. A land rush from the old riverside city to trendy new lakeside suburbs ensued; assessed property value citywide grew during 1900-14 by 80 percent, to \$250 million. Death rates that ranged around 7 percent in the late 1700s (seventy annual deaths per one thousand population) and 4.3 percent in the 1800s, declined to 1.8 percent in the two decades following the installation of the drainage system.³⁵² Malaria and typhoid deaths decreased tenfold, and yellow fever disappeared forever after one last epidemic in 1905.

By 1925, the New Orleans drainage system served 30,000 acres with a 560-mile network of canal, drains, and pipes and a total pumping capacity of 13,000 c.f.s. Neighborhoods with names like Lakeview and Gentilly Terrace arose in the spacious style of suburban California, a world away from the traditional local cityscapes a mile or so away. Pumps that were originally located behind the city’s old neighborhoods were now in front of its new ones.

The Sewerage and Water Board in modern times drains over 61,000 acres in Orleans and neighboring Jefferson Parish of nearly thirteen billion cubic feet of water annually. Ninety miles of covered canals (many beneath neutral grounds), eighty-two miles of open canals, twenty east bank pumping stations, two West Bank stations, and ten underpass pumps combine to siphon rainwater into neighboring water bodies at 45,000 cfs, ten times the 1915 capacity and “enough to fill the Louisiana Superdome in 35 minutes.”³⁵³ Most of New Orleans, from uptown to the French Quarter to Gentilly and Lakeview plus “Hoey’s Basin” in Old Metairie, Jefferson Parish, drains northward through the 17th Street, Orleans, and London Avenue canals into Lake Pontchartrain. By water and the Upper and Lower Ninth wards, once a single natural hydrological basin, until it was bisected by the Industrial Canal, drain into that man-made waterway. New Orleans East drains mostly northward into the lake, except for the area south of Chef Menteur Highway, which flows into the Intracoastal Waterway and out to the gulf. Algiers, also its own basin, drains into the man-made Algiers Canal and southward into Bayou Barataria. Drainage of the “old city,” west of the Industrial Canal is dependent on the immediate action of engineers to power-up the pumps and get that runoff mobilized out to Lake Pontchartrain as soon as possible, before it accumulates “in the bowl.” There are no retention ponds for temporary water storage. More recent systems, such as in New Orleans East, were wisely designed to be more forgiving: there, lagoons and open canals store a certain amount of runoff, giving the system some leeway before requiring it to pump the water out. Thus, less pump capacity is needed, and response time is extended.

The draining of the New Orleans backswamp radically altered nearly every imaginable geography of New Orleans, from patterns of urban infrastructure and architectural style to spatial distributions of ethnicity, race, and class (see “*Two Centuries of Paradox*”). It worked hydrology and topography by slashing open the marshes with canals and lining them with earthen berms, thus creating new sub-basins and dangerously penetrating the city’s heart with surge-prone waterways. It changed New Orleans vertically, allowing freshly drained hydric soils to subside by as much as ten feet. It might have also affected local climate: temperatures in New Orleans increased by eight degrees in summer and dropped by four in winter between 1900 and 1918. The Weather Bureau attributed the polarization to the recent swamp drainage, which reduced surface water and its stabilizing effect on air temperature.³⁵⁴

Municipal drainage represented the single most dramatic transformation of the New Orleans cityscape, delivering many blessings but also creating the circumstances that rendered Hurricane Katrina’s floodwaters not merely disastrous, but catastrophic. The brilliant engineering solution that “drained dry” the graded backswamp and allowed it to be “covered with gardened homes,” had indeed created scores of beautiful neighborhoods and thousands of happy homeowners. It also enticed people into harm’s way with a fatally false sense of security.



“Ornament to the City”

The Lakefront Project, 1926-1934

Five miles from the bustling quay of the Mississippi lay historic New Orleans’ “other waterfront: the grassy shore of the semi-brackish inland bay known by the quaint nickname of Lake Pontchartrain. Low, marshy, and remote, the lakeshore remained a wilderness in the early decades and a shabby town of fishing camps and jerry-built shacks into the early twentieth century. The only exceptions were West End, Spanish Fort, and Milneburg, which served as lakefront resorts for city dwellers and mini-ports for the waterways and railroads connecting with downtown.

The municipal drainage project of the early 1900s transformed those marshes into valuable real estate. As white middle-class New Orleansians eagerly moved out of crowded riverside neighborhoods and into the new lakeside suburbs, engineers turned their attention toward reinforcing the lakeshore against hurricane-induced storm surges, such as the one caused by the Great Storm of 1915. At first, the Orleans Levee Board built a levee about 300 feet in and from the marshy shore (now Robert E. Lee Boulevard), but the high humus and water content of the soils resulted in shrinkage and subsidence. A more ambitious solution had been envisioned decades earlier, by city surveyor W. H. Bell, whose *Plan of Property Improvement for the Lake Shore Front of the City of New Orleans* (1873) first broached the idea of combining flood protection with residential and recreational land creation. Why settle for a flimsy levee when you can build a solid seawall and create high, dry scenic real estate at the same time?

In 1924, chief engineer Col. Marcel Garsault was commissioned to develop the concept, and within the year emerged with a plan so ambitious that the Levee Board needed additional constitutional authority to approve it. A curving levee reinforced by a stepped concrete seawall, over five miles long and a half mile offshore, would be built in the lake; bottom sediments would then be dredged and pumped into the bemired enclosure behind it, creating new land over five feet high. Colonel Garsault’s plan also called for the improvement and sale of the new land to offset the original \$27 million price tag.

Work on the “Lakefront Improvement Project” began in 1926. A temporary wooden bulkhead was constructed 2,500-3,000 feet offshore to an elevation of two feet above lake level. Lake-bottom sediment was then hydraulically pumped behind it until flush with the levee top. The bulkhead was then strengthened and raised by four feet, then filled again to the brim. The entire process took over three years; the result was 2000 new acres of lakefront land, averaging four to six feet above lake level or roughly half the elevation of the original levee. A stepped concrete seawall, designed after similar structures on the Florida coast, completed the project in 1930.

What to do with this scenic new land? One plan allocated most acreage to

recreational parkland use; another proposed lagoons and canals among parklands and residences. A compromise allowed for the public recreational development of lands between Lakeshore Drive and the lake, and residential and public-facility development (sans lagoons) of remaining areas. Land sold to pay off the Levee Board's bonds spawned new residential neighborhoods such as Lake Vista, Lakeshore, Lake Terrace, and Lake Oaks, developed during 1939-60. The Lakefront was also home to Pontchartrain Beach (for which only blacks bathed at Lincoln Beach from 1955-64), an amusement park, marinas, recreational facilities, and a branch of Louisiana State University that became the University of New Orleans in 1975.³⁵⁵ "Lakefront was and is an ornament to the city," wrote geographer Peirce Lewis, "one of the very few places where twentieth century city planning has truly improved a large area of an American city."

"It is some measure of the project's scale," continued Lewis, "that a municipal airport was added to the Lakefront scheme almost as an afterthought,"³⁵⁶ through the efforts of politically connected Levee Board president Abe Shushan. Built in 1931-33 on a triangular peninsula jutting into the lake, Shushan Airport required no real estate acquisition, did not interfere with existing infrastructure, provided obstruction-free approaches and departures, and allowed for inexpensive expansion farther into the lake.³⁵⁷ At the time one of the finest airfields in the nation, Shushan Airport, along with the Naval Air Station, played an important role in preparation for the air war against Germany and Japan. Today, the 200-acre man-made peninsula, now Lakefront Airport, hosts a 3,379-foot-long air strip, a terminal with great Art-Deco styling, and extensive use by corporate and private aircraft.

Now more than one-quarter the age of the city, the Lakefront pads the northern edge of New Orleans from the Jefferson Parish line to the Industrial Canal. In utter contrast to the old riverfront city, Lakefront New Orleans today is spacious, sprawling, suburban, relatively prosperous, and privy to expansive horizon-wide vistas of water and sky. It presents a subtropical coastal ambience associated more with modern-day coastal Florida hundreds of miles away, than with historic riverine New Orleans five miles away.

Despite its success in creating new residential land, the Lakefront Project was primarily designed to resist gulf-fueled storm surges. It served this function well during Hurricane Katrina, remaining mostly dry while preventing ten-foot-high lake waters from spilling into eight-foot-low residential neighborhoods. The same can not be said for the slender levees and floodwalls lining the city's outfall canals—the very canals that enabled urban expansion toward the lake, and necessitated the Lakefront Project.



Buckets, Gutters, Cisterns, and Taps

Potable water problems in a city surrounded by water

New Orleansians (once) obtained their domestic water by purchasing it from street vendors—one *picayune* for four buckets—or scooping it themselves from the Mississippi. Homemakers would then remove the sediment with stone, alum, or charcoal filters and store the cool and transparent water in earthen jars.³⁵⁸ For all the impurities, it ranked as the best fresh water source around. “When filtrated, it is transparent, light, soft, pleasant and wholesome,” reported Maj. Amos Stoddard in 1812. “The salubrious quality of [Mississippi River] water is attributed in part to the rare and sulphur [and the river’s] deep and rapid current....”³⁵⁹ Another observer in 1802 ascribed miraculous powers to the resource:

The Creoles say the Mississippi water, which they drink, has a tendency to make them prolific. It is a fact, that women who in other parts of the world could never breed, have become pregnant in a year after their arrival in Louisiana.³⁶⁰

Water for other domestic uses came from shallow, muddy wells dug in courtyards. The great river flowing but one block away went largely underutilized for lack of a mechanized system to pump it over the levee and distribute it throughout the city.

A system worthy of Biblical times was attempted in 1810 on the levee at Ursulines Street. Slaves pumped river water into a raised tank, which thence flowed by gravity through hollow cypress logs to subscribers. Famed architect Benjamin H. B. Latrobe designed a vastly improved system a few years later: a steam pump mounted in a three-story pumphouse would draw water from the Mississippi, store it in raised cast-iron reservoirs, and distribute it to nearby basins and through a network of cypress pipes to residences. Over a decade in the making and fraught with legal problems, Latrobe’s waterworks were finally completed three years after the architect’s death (to yellow fever), and served the city from 1823 to 1830. His son, John H. B. Latrobe, witnessed the operation in 1834:

The water works erected by my father are in operation... I saw this morning the water bubbling up from the pipe into the large cast iron box around them, and running off in a rapid stream through the gutters. At every corner were crowds of negro women filling their buckets and water carts supplying themselves from a less polluted place than the margin of the river. After my father[’]s death these works, in an unfinished state, fell into the hands of the corporation, and [their present state] is much less efficient than they were capable of under a proper management.³⁶¹

Today, a beautiful little park at Decatur and Ursulines honors Latrobe’s achievement.

The city's rapid growth in this era spawned new private water companies. Premier among them was the Commercial Bank of New Orleans (1836), whose waterworks system served parts of the Second Municipality now comprising the Lower Garden District, Garden District, and Irish Channel. Sixty-horsepower steam pumps located at Poydras and Richard streets drafted water from twelve feet beneath the Mississippi's surface at a pace up to 2,280 gallons per minute, and propelled it through an eighteen-inch-wide, 200-yard-long iron pipe into a raised reservoir spanning a rectire city block. From there, a network of smaller cast-iron pipes delivered the gravity-fed water to commercial and domestic clients, who paid a rate of three dollars per head. By one account, nearly 1,300,000 gallons per day were distributed in this manner in 1841.³⁶²

The Commercial Bank oversaw commercial operations from 1836-69, after which the city took over until 1878, when it deeded the system over to the New Orleans Water Works Company. Monopoly status, upheld in court, precluded the rise of competing systems. By the 1880s, about eight million gallons per day were pumped through seventy-one miles of cast-iron pipe, creating a small domestic water supply for those few who were connected to the system. Lack of modern purification processes, plus mismanagement and unreliability, rendered the system inadequate and forced residents to satisfy their potable-water needs through what one writer described in 1893 as "one of the strangest and most distinctive features of New Orleans[:] connecting-tanks for rain water in almost every door-yard."

Rising above the palms, the rose-trellises and the stately magnolias are these huge, hooped, green cylinders of wood. They suggest enormous watermelons on end and with the tops cut off. . . . Nine-tenths of the water used for cooking and drinking is this cistern water....³⁶³

Into the 1850s, "practically the whole city depended on rain water caught on their roofs and stored in cisterns as the source of drinking water."³⁶⁴ This meant that, during dry spells, many residents of this water-surrounded city actually suffered water shortages, particularly the poor living in the back-of-town. During droughts, water was sometimes "delivered" simply by pumping it through the open gutters. This tactic, in 1883, serendipitously provided another Mississippi River resource to New Orleans: "Many of these gutters are alive with small fish and river shrimp, and they furnish a harvest to the boys who catch them...."³⁶⁵

The progressive municipal-improvement era of the late 1800s finally inspired the development of a full-scale modern municipal water system (as well as drainage and sewerage systems) in New Orleans. Research conducted at Audubon Park in the 1890s helped determine optimal methods for purifying sediment-laden river water, debunking claims that only artesian wells or Lake Pontchartrain could provide potable water. The New Orleans Sewerage and Water Board, established in 1899, sited the new waterworks plant in the extreme upriver neighborhood of Carrollton. This location occupied, at the time, the semi-rural edge of the city, upstream from sources of urban pollution and above the salt-water intrusions occasioned by extremely low river stages or

hurricane-induced gulf surges.³⁶⁶ The site also provided the maximum amount of head for distribution to houses, because it tapped the river at a slightly higher stage than in other parts of the city. (The river gains about 1.5 inches in stage per river mile heading upriver in the metro area; thus the river at the Carrollton intake flows on average over one foot higher than at the French Quarter.) Locating the plant 3000–4000 feet from the river kept it safe from shipping activity, wharves, and railroads, while siting it just within the Orleans Parish line kept it within local government control, even if it did supplement some residential Hicks.

The Carrollton Water Works Plant, started in 1905 and opened in 1906, drew water from the Mississippi by an intake pipe and pumped it into a “head house,” the controlling node at the center of a series of reinforced concrete reservoirs. The water then passed slowly over the “grit reservoir,” where the coarsest particles settled out, then returned to the head house to be pumped into the “lime dosing reservoir,” where lime and sulfate of iron were added for softening. Next, the water returned to the head house to be sent to the “coagulating reservoir,” where finer particles of suspended sediment were precipitated out. Finally, the water was again sent back to the head house, strained through sand filters, poured into “equalizing reservoirs,” treated with a small dosage of chloride gas, and stored in the clean water well to await delivery. Eight pumps then propelled the purified water through distribution mains to city residents everywhere except Algiers. Water mains were laid starting in 1905; by 1910 they extended 512 miles, by 1926, they measured around 700 miles and opened most of the urban footprint. The number of water meters soared from around 5,000 installed in 1900 (one per fifty-seven people) to 22,600 in 1910, 36,600 in 1920; and nearly 96,000 in 1927—one for every four people, or roughly every household. In this manner, modern engineering technology delivered a tiny fraction of the runoff of the North American interior—33,000,000 gallons per day in the 1910s, or 0.01 percent of normal river volume—into the kitchens and courtyards of New Orleansians.³⁶⁷

Today, a greatly enlarged Carrollton Plant operates on the same century-old site; while the treatment process is modernized, some key antique infrastructure remains. Water is drawn from the Mississippi through two screened intakes straddling the parish line: the three-pump, 210-million-gallon-a-day New River Station built on the Jefferson side in 1982, and the backup Old River (Oak Street) Station with four circa-1928 pumps on the Orleans side. Drawn water flows downhill for about eight blocks toward the East Bank Water Treatment Plant, where lime, ferric sulfate, and polyelectrolyte are added. The water is then (1) slowly paddled through mixing and settling basins, where fine-grain river sediments are mechanically removed and returned to the river; (2) disinfected for bacteria with polyphosphate, chlorine, and ammonia, and treated with lime to adjust pH, soften the water, and control corrosion; (3) pumped through a second complex of large reservoirs for further settling and disinfection; (4) treated with fluoride for tooth protection; then (5) passed through two sand-filtration facilities for final treatment. The tap-ready H₂O is either stored in ten large round tanks lining South Claiborne Avenue, or pumped through the South Claiborne or Panola Street stations to thousands of East Bank customers. The West Bank and adjacent parishes are handled through separate, similar systems.³⁶⁸

Into the twenty-first century, the Carrollton and Algiers plants distributed 125 million gallons of river water per day through 1,610 miles of water mains (ranging in diameter from three to 45 feet along trunk lines to eight to twelve inches under French Quarter streets) to 160,000 service connections and virtually the entire population. This abundant water supply remains one of the city's greatest and most reliable blessings—cheap, at about \$0.03/gallon, and surprisingly high in quality.

The problem is the infrastructure, primarily the power stations and the pipe network, of which one-third is roughly a century old. Concerns remained tolerable, patchable, and largely hidden until Hurricane Katrina arrived in late August 2005. Wind-uprooted trees, rocked houses, and broke underlying water lines, but the pumps kept water flowing through the system. After the levees broke, however, floodwaters swamped the century-old South Claiborne electrical power plant, stilling the movement of the life-sustaining resource to the thousands of people trapped in the city. Many New Orleanians who remained during Katrina remember well that unsettling moment on Wednesday, August 31, when a twist of the tap yielded a spurt of rusty water, a sputter of air, and a dark new outlook on the city's future. There was now no water to drink, no indoor sanitation, no showers to escape the heat, and, most ominously, no hydrant water to extinguish fires. Blazes claimed scores of structures, even as water inundated them.

Heroic action and creative jury-rigging on the part of the Sewerage and Water Board allowed reasonably safe tap water (as well as sewerage and drainage) to return to unflooded areas by late September, and to most of the city months later. The system, however, remains gravely compromised, with 50,000 patched leaks, a billion dollars in storm-related damages, \$2.2 billion needed to replace the aging distribution system, and \$125 million to renovate the antique twenty-five-cycle South Claiborne electrical plant—one of the last of its type in the nation—with modern sixty-cycle motors.³⁶⁹

Serious as these problems are, they are solvable. New Orleanians remain blessed with an abundant and reliable supply of fresh water, especially in light of the municipal water shortages in urban areas across the nation and globe. A water surplus in the Crescent City and a shortage in Florida have led some to ponder the economics of exporting Mississippi River water as a commodity.³⁷⁰ The water is here, the shipping lanes and port facilities are established, the technology is available; the only obstacle is cost, and if present trends continue, willing buyers may someday call. More ominously for New Orleans, future water shortages in the urbanizing Southeast may motivate the diversion of certain eastern tributaries of the Mississippi, much like northern California rivers have been rerouted to quench the thirst of the state's southern metropolises.

Indeed, New Orleans has in its hands what may prove to be the most coveted natural resource of the twenty-first century.



Lessons in Over-Reliance

The once-lusty and now-diminished economic importance of the Mississippi River

The Port of New Orleans recently ranked as the fourth busiest shipping port in the nation, with 6,000 ocean-going vessels calling per year and 2,000 depositing or loading nearly ninety million tons of cargo. When combined with the nearby Port of South Louisiana along the River Road, it easily ranks first nationwide. Before Katrina, the city's port supported over 107,000 jobs, pumped \$13 billion into the local economy, earned an additional \$2 billion, and contributed \$231 million to state tax coffers annually. Important as the shipping industry is to the city, it is nowhere near as fundamental as it was in historical times, when New Orleans enjoyed a near-monopoly on Mississippi valley trade.

As the trans-Appalachian region developed in the early nineteenth century, the emerging frontier society produced immense supplies of agricultural commodities in search of sources of demand. A Missouri hunter, an Illinois corn farmer, a Mississippi cotton grower, or a Louisiana sugar planter had little choice but to ship his harvest downriver to reach urban markets on the Eastern seaboard and Europe. Shipping out of the trans-Appalachian West, which nearly tripled from approximately 60,300 tons in 1810 to 176,400 tons in 1825, went down the Mississippi to New Orleans to a degree of over 99 percent; only a tiny portion found its way out the Great Lakes and St. Lawrence River or other routes to eastern markets.³⁷¹ At the premier transshipment point before reaching open seas, New Orleans prospered in financing, marketing, and handling these commodities. Planters also used the river to get to New Orleans to conduct business, meet with financiers, buy supplies for their estates, educate their children, or socialize and entertain. Few other transportation options existed, particularly when bulky commodities needed to be moved long distances. The lion's share of New Orleans' spectacular wealth and meteoric rise between the Louisiana Purchase and the Civil War can be traced to river-related activity, as a cotton and sugar port and later as a handler of coffee, tropical fruit, and a myriad of other freight. The antebellum riverfront bustled with carefully managed shipping activity; protruding docks and wharves spanned well over two miles, with certain sections reserved specifically for flatboats, steamboats, schooners, ferries, ocean-going sailing ships, and "planters' pirogues."³⁷² "So long as New Orleans enjoys her present advantages by location on the Mississippi river," wrote the *New Orleans Bee* in 1836, "so long will her commerce continue to be augmented, and her property secured."³⁷³ Nearly everyone agreed. "Mississippi Obsession" is how one historian would later characterize the city's supreme confidence in its geographical advantage.³⁷⁴

The advantage did not last so long, at least not in its purest form. Competition started in 1825, when the newly completed Erie Canal gave New York City and the

Eastern Seaboard waterborne access to the trans-Appalachian region. Excavation commenced a decade later on the Illinois and Michigan (I & M) Canal, which would give the emerging city of Chicago a piece of Mississippi River trade. More canals followed; emigrants flowed westward, and new river towns and cities sprouted on the western frontier. Still, a later government report,

[before] 1835 transportation had been north and south on the river, and New Orleans from advantage of position had developed commercially with little effect on her port. In 1835 the trade was to some extent diverted to an east and west direction by the opening of the Erie and other canals, [while] Pittsburg and Cincinnati were rapidly developing....³⁷⁵

In the 1830s, according to one historian, “an increasing percentage of western produce traveled on the canals directly to the East. New Orleans’ share of the total was export was decreasing, but the tremendously rapid rate of growth taking place in the agricultural West concealed New Orleans’ declining position.”³⁷⁶ Whereas Western shipments to New Orleans comprised at least 32 percent of the port’s total receipts in 1840 they fell to only 18 percent by 1858; that activity increasingly flowed eastward on the Ohio, across the Great Lakes, and through man-made canals or rolled over an ever-increasing network of railroad tracks. By another measure, New Orleans controlled over 99 percent of trans-Appalachian shipping up to 1825, but only 80 to 90 percent in the 1830s, 60 to 70 percent in the 1840s, and around 50 percent in the 1850s. By the eve of the Civil War, New Orleans’ former Mississippi Valley monopoly had to be shared with the Erie Canal, the I & M Canal, the New York Central Railroad, the New York & Erie Railroad, the Pennsylvania Railroad, the Baltimore & Ohio Railroad, and an emerging network of other transportation options throughout the Midwest.³⁷⁷ “[T]he flow of western trade reversed itself,” wrote two prominent historians, “the economic unit known as the Mississippi Valley had been turned on its head, so that the Mississippi River was flowing north.”³⁷⁸

Getting a shrinking share of a dramatically growing antebellum economy (see graphs, “New Orleans’ Meteoric Rise... and Relative Decline, 1810-1860”). New Orleans concentrated on short-term enrichment. After all, Mississippi Valley shipments to New Orleans increased *thirtysix-fold* from 1810 to 1860, when over 2,167,000 tons of domestic commodities kept the city’s wharves busling.³⁷⁹ The city grew spectacularly too, boasting in 1860 over twenty times the population from late colonial times. Why waste time preparing for a rainy day when business is booming right here and now? Even after the Civil War, New Orleans’ population continued to grow by tens of thousands per decade, and the river remained the city’s most reliable source of income. It was still faster and cheaper to ship agricultural commodities down the Mississippi through New Orleans to Liverpool (forty cents per bushel and thirty-one days), than to send them on rail to Chicago, to Buffalo by lake, to New York by canal, and then to Liverpool (sixty-four cents per bushel and fifty-two days).³⁸⁰

But “[p]hysiologists make a distinction between the growth and the development of an organism,” pointed out historian John G. Clark. “New Orleans [in the nineteenth century] experienced growth, but... did not demonstrate a developmental

capacity comparable to that of other major urban centers, [doing] little to expand upon or improve her natural advantages.”³⁸¹ Over-relying on the Mississippi River, New Orleans’ conservative business class faltered in developing back-up competitive advantages in value-added industries and investing in the latest transportation technologies. In particular, competition from railroads—from nonexistent in 1830, to 9000 miles of railroad track in 1850, to 125,000 miles in 1900—eroded the city’s once-exalted destiny. New Orleans’ ranking among American cities in terms of population helps illustrate the irony: pairing of absolute growth with relative decline: when the city overwhelmingly controlled the Mississippi Valley, its population *and* rank increased, from seventh-largest in 1810 to fifth-largest in 1820 and 1830 to third-largest in 1840, its all-time peak. But as canals and railroads began directing wealth elsewhere, New Orleans dropped to fifth place in 1850, sixth in 1860, and ninth and tenth after the calamity of the Civil War.³⁸²

New Orleans’ economic dilemma—exploiting today’s boom versus preparing for tomorrow’s bust—was not lost on the city’s business class. On the contrary, leaders fretted constantly about encroaching competition. “We have been accustomed to look to the Mississippi as the protector of our greatness,” wrote one shrewd editorialist in 1850;

We have thought that as long as the mighty Mother of Waters continues to roll past our city, our superiority in a commercial point of view, never can be successfully attacked. Time, the corrector of all errors, has demonstrated the fallacy of our belief. It has shown us that we are by no means impregnable; that our position, unequalled though it may be, can be made useless to us, when railroads and canals, intersecting the valley of the Mississippi in every direction, offer to the producer a cheaper and readier transit....

New York has her great Erie Canal, Boston her Western Railroad, Philadelphia her canals and railroads, Baltimore her communications with the Ohio Valley—by all of which a large portion of our legitimate trade is diverted from us. Charleston, Savannah, and even Mobile are now preparing to grasp a share of the spoil....

In the meantime New Orleans has contented herself with contemplating the Mississippi, boasting of her magnificent position and unbounded resources, and yet has done nothing at all to preserve her advantages which nature has conferred to her.... [S]he has begun to discover that the steam engine or even an artificial ditch is a powerful rival....³⁸³

Local businessmen did take action, but it proved negligible in the face of daunting economic-geographical realities. Railroads eventually came to New Orleans, but, isolated as the region lay from the great Northern metropolises, could never rival the intricate web of tracks that unified the Midwest and the East. Some value-added industries arose in the early twentieth century, but they mostly handled petroleum and chemicals, employed relatively few laborers, and arguably occasioned more costs than benefits to the local society. Major shipping canals would also come, dug in the 1910s-60s toward the worthwhile goal of making the port more competitive. But in a tragic

irony, the artificial waterways allowed salt water and hurricane-induced storm surges to penetrate city limits and in 2005, nearly caused the death of the very city they were supposed to enrich (see *Scoring and Scouring the Land*).

Ever-expanding Northern waterways, seaways, railways, highways, airways, and pipelines meant that by the 1900s, the monopoly once enjoyed by New Orleans on Mississippi Valley traffic now looked more like monopolistic competition. Whereas waterborne transportation moved nearly all freight in early-nineteenth-century America, only about 15 percent of intercity commercial freight travels on inland waterways today; the rest is handled by railroads, trucks, pipelines, and aircraft. A modern-day cotton or sugar producer, unlike his ancestor, now has numerous transportation options to get his commodity to market, few of which involve either the Mississippi or the Crescent City. He might only need to come to New Orleans for a trade show—*by air*.

In the 1950s and 1960s, a technological breakthrough transformed the shipping industry. To speed the handling of freight in individualized odd-shaped units, engineers developed standardized “containers” gripped by cranes and gantries in mass-production mode, like a factory. The simple but revolutionary idea allowed for the efficient handling of cargo between vessel and train or truck with a minimum of labor and dock space. Containerization swept through the shipping industry, within a few years and radically altered the geographies, economies, and cultures of port cities worldwide. It meant that great ports no longer really needed great port cities; rival ports expanded in smaller population centers (witness Gulfport, Mississippi), or opened in remote areas (witness Port Fouchon, Louisiana). In New Orleans, thousands of longshoremen, stevedores, dock workers, and other riverfront laborers gradually lost their jobs to machines, or to competing ports and their machines. Worse yet, most vessels currently calling at the Port of New Orleans constitute tankers or cargo vessels, which generate even fewer local jobs than containerized ships. The hospitality industry now trumps port activity as the city’s premier source of employment.

Containerization also meant that great ports no longer needed to occupy so much waterfront space. Mechanization meant concentration. In New Orleans, many riverfront wharves and warehouses deteriorated and were cleared away for recreational and tourism-related venues, such as the Moor walk, Woldenberg Park, and the Riverwalk festival marketplace (1970s–80s). The process of “reclaiming” the riverfront for people continues today, as planners propose a contiguous stretch of public facilities and green space from Poland to Jackson venues. This is a healthy trend—and, oddly, a reversal to historical times, when citizens “promenaded” nightly along the riverfront to enjoy waterfront breezes. But it also reflects a probably irreversible downturn in the industry over which New Orleans was fated to reign. The Port of New Orleans is still critically important to City of New Orleans, employing thousands of people and generating millions of dollars, but, in truth, the city today needs the port more than the port needs the city.³⁸⁴



By its commanding position in this vast country, New Orleans will... become one of the richest markets in the New World.

—James Pitot, circa 1802

New Orleans will be forever, as it is now, the mighty mart of the merchandise brought from more than a thousand rivers; [i]n no such position for the accumulation and perpetuity of wealth and power [has] ever existed.

—Thomas Jefferson, 1804

...a port or two [here] would make us masters of the whole of this continent.

—René-Robert Cavelier, sieur de La Salle, circa 1684

Many factors explain New Orleans' failure to achieve those gleamy visions from centuries past. Chief among them is the ineluctable reality that the Mississippi River, despite its magnitude and importance, now represents but one of a number of transportation options in and out of the world's richest valley. "[F]aith in the invulnerability of geographic location dulled the mind and tempered the energies of the business community of New Orleans," wrote historian John G. Clark, preventing its leaders from calculating accurately and quickly the significance of threats to their commercial hegemony.³⁸⁵ Once the third-largest city in the U.S., New Orleans fell to the thirty-first largest in 2000, and as low as the sixty-seventh largest city in the country one year after Hurricane Katrina (see graph, "Tracking New Orleans' Ascent and Decline 1790-2007").

The historical splendors of old New Orleans that remain with us today may be viewed as a grand and splendid vestige of an economic geography that no longer exists.

Biological Manipulation

*Human agency in the translocation of species—
and transformation of the environment*

Describing species as "native" or "alien" to a particular place presupposes a certain order in the world, a perception that selected life forms "belong" to delineated ranges. In reality, species move about as much or as little as circumstances or serendipities permit; some cross entire hemispheres seasonally while others unintentionally wander permanently to new regions and continents. Humans have participated in this

biological diffusion by dispersing themselves as well as thousands of other species, intentionally or accidentally. Categorizing species as native or alien, and thence presuming the former to be benign and the latter malignant, is a human construct, one that ignores spatial and temporal continuums—not to mention our own place in nature.

Yet one cannot refute that the pace of species translocations has radically accelerated with the technological advances and economic globalization of the past century. Nor can one deny that for every introduced species that proves to be lucrative and beneficial (such as, in Louisiana, sugar, cotton, and soybeans) or otherwise desirable (such as cherished “Southern” ornamentals such as azaleas and crepe myrtles), others are indisputably destructive and costly. Anthropogenically translocated species in general are known as “introduced,” “non-indigenous,” or “alien” species; those that are viewed as pests are ascribed the adjectives of “invasive” or “nuisance.” The tags are subjective, and sometimes contested.³⁸⁶

Louisiana's humid subtropical climate, myriad waterways, and productive coastal wetlands make it ideal habitat for the establishment of species that evolved elsewhere. Centuries of shipping traffic have occasioned the accidental relocation of hundreds of species to this new environment, while deliberate introductions of agricultural crops, animals, and ornamental plants account for even more biological reshuffling. Railroads, canals, roads, and interstates perform critical economic functions but also serve as conduits for further biological diffusion. The result: roughly a thousand species of flora and fauna once unknown to Louisiana now thrive in the state. Of the world's 100 “worst” invasive species according to the French environmental organization *Fondation d'Entreprise*, at least thirteen occur in southern Louisiana. One-third of The Nature Conservancy's “Dirty Dozen” list of the most destructive invasive species in the U.S. are found in Louisiana, a state that comprises only 1.4 percent of the nation's conterminous land area. The U.S. Geological Survey's database of non-indigenous aquatic species shows that Louisiana has more introduced aquatic plants (thirty-two) than any other state except Florida, which has forty-five. It is home to almost two-and-a-half times the average number of introduced aquatic plants per state.

Four particular invasive species have caused disproportionate damage to southern Louisiana ecology and society. Two were introduced accidentally, two deliberately. Historically, *Aedes aegypti* ranked as the most detrimental, even as it went all but unnoticed. This mosquito, native to Africa, arrived to the Caribbean and later French colonial Louisiana in the early 1700s, probably in water stored on slave ships. *Aedes aegypti* itself was merely a pest, but it carried the yellow fever virus which claimed the lives of over 100,000 Louisianians, and 40,000 New Orleanians, between 1796 and 1905. Discovery of the culprit in the early 1900s remains one of history's great medical breakthroughs. Mosquito control has since eradicated yellow fever in the region and nation, but *Aedes aegypti* still thrives in New Orleans, and continues to transmit dengue and yellow fever throughout the tropics.

Water hyacinth, a lush aquatic plant with a beautiful purple flower, was deliberately introduced as an ornamental at the 1884 World's Industrial and Cotton Centennial Exposition at Audubon Park. Other individuals around the same time imported it directly from South America. Finding ideal habitat in the highly productive freshwa-

ter wetlands of southern Louisiana, hyacinth established itself throughout the region, clogging waterways, out-competing native aquatics, starving water of light and oxygen, and creating mosquito habitat. National newspaper reports attested to the incredibly rapid spread of the aquatic plant; the following piece appeared in Illinois in 1895 under the title “Navigation Impeded by Flowers.”

It assisted in migrating making a lot of trouble in Louisiana. It is a plant, a water hyacinth, which a man from New Orleans saw and admired about three years ago while on a visit to Colombia. He brought some bulbs [home] and grew them in tubs in his front yard. In about two years patches of the flower appeared in Bayou St. John.... In another year the bayou was full of it, so that navigation was impeded. Now all the canals near New Orleans are overrun and covered up with this invading flower; great masses of it are floating in the lake; rivers running into the lake are choked with it, and it has traveled a hundred miles to the westward of New Orleans.³⁸⁸

Two years later, Congress appropriated funds “to investigate the obstruction of the navigable waters of Florida, Louisiana and other South Atlantic and Gulf States by the plant known as the water hyacinth”³⁸⁸—a costly and constant battle which continues to this day.

Even more damaging to coastal wetlands are nutria, a large furbearing rodent from Argentina originally imported to California for fur in 1899. Specimens made their way under controlled circumstances to breeders in St. Bernard Parish, who sold some to the McIlhenny family (of Tabasco Sauce fame) during the Depression. Intentionally released animals (1940-45) and escapes subsequently spread from Avery Island throughout the coastal marshes, oftentimes aided by state fish and game officials, who viewed nutria as a boon to the state’s fur trapping industry. They were—until the 1980s, when fur fell out of fashion in favor of leather for women’s coats. Prices dropped from over ten dollars a pel to as low as a dollar; trappers looked for other lines of work, and the nutria population exploded. The rodents devoured marsh grasses in expansive contiguous areas known as “eat-outs,” exposing thin silty coastal soils to wind and water erosion and exacerbating the degradation of hundreds of thousands of acres of coastal marsh. They also displaced native muskrat populations. A state bounty program offering four to five dollars per tail that motivated some trappers to pursue nutria again, resulting in 1.6 million kills since 2002 and reducing nutria-damaged marsh from around 80,000 acres per year to 34,000 in 2007.³⁸⁹ But, with phenomenal reproductive rates and a geographical range now spanning all three continental-U.S. coasts, nutria are likely to remain a permanent part—and cause—of the shrinking Louisiana landscape.

During the World War II era, ships arriving from East Asia unknowingly brought in a tiny winged pest which today costs New Orleanians \$300 million annually. Formosan termites, infested in wooden shipping pallets, found an agreeable climate and plenty of wooden housing stock in the port cities of Houston, Mobile, and New Orleans; they soon spread throughout the Gulf South via shipping lanes and relocated lumber and railroad ties. For years, the household pesticide Chlordane drove the Formosans out of treated structures and into urban trees, weakening them structurally and

oftentimes causing their collapse. When Chlordane was banned in 1988, Formosan termites proceeded to infest houses, showing a particular taste for the old timbers of historical structures. Recent control attempts by the U.S. Department of Agriculture and local entities have, at best, only stabilized the problem, which has since spread to the entire southern tier of the United States. Formosan termite control efforts are now literally embedded in the cityscape: during the 1990s, custom-designed traps topped with unmarked aluminum disks were drilled into French Quarter sidewalks, their purpose halting to newcomers.

Few would argue that any "good" came from these four biological introductions, among many others. Similarly, few would claim that other importations, such as wheat, soybeans, popular ornamentals such as azaleas, and game birds such as ring-necked pheasants represent costly ecological evils that must be eradicated. (Indeed, were it not for two non-native species, cotton and sugar, New Orleans never would have grown as dramatically as it did during its nineteenth-century heyday.) Only this certain species' introductions demonstrate that humans are active agents in the biological manipulation of their environs, a freak accident or a naïve tinkering in the distant past may yield untold consequences in the future.