

Basin Street blues: drainage and environmental equity in New Orleans, 1890–1930

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Before 1900, Blacks typically occupied the swampy portions of New Orleans, Louisiana. As the city embarked on an ambitious Progressive Era public works project to improve drainage in the 1890s, it began to overhaul environmental conditions. This process, if carried out according to rational engineering principles, would serve the entire city equitably. At the same time as the improvements, Jim Crow policies appeared in the political landscape and presented a potential challenge to equity in the engineering project. An examination of the design and delivery of drainage and sewerage services compared with racial segregation offers insights into the discussion of environmental equity and also the agents of segregation in New Orleans. By 1930, engineering concerns overcame racist tendencies in delivering public services. Drainage allowed Blacks to move into previously uninhabited portions of the city, but Jim Crow policies ultimately limited their movement out of the lowest sections of the city.

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Introduction

Basin Street takes its name from a turning basin at the upper end of a canal that drained nineteenth-century New Orleans into Lake Pontchartrain (Figure 1). Although the basin was the headwaters of the canal, a mere five feet of fall aided flow towards sea level. Adjacent to the turning basin, Blacks had created Congo Square, a place where they congregated. By contrast, land near the riverfront was about 10 feet higher. There stood the splendid St Louis Cathedral facing the civic plaza, Jackson Square. The two most prominent social spaces for African- and Euro-American residents exemplify the subtle topographic separation of the races in the post-bellum Crescent City. With greater means and power, the White population occupied the better-drained sections of the city, while Blacks typically inhabited the swampy ‘rear’ districts before 1900.^[1] Environmental inequity was inherent in this geography.^[2]

Plans to improve the city’s drainage system presented an opportunity to overhaul the city’s environmental conditions and its racial geography. In order to remove run-off from frequent summer storms and expel municipal sewage, 1880s New Orleans relied on an ineffective series of gravity-fed canals, such as the one terminating at Basin Street. After half a century of marginally successful privately financed public works projects, the city embarked on a major improvement programme in the 1890s. The project sought to provide a publicly financed city-wide drainage system to eliminate health problems associated with the existing open canals. It attempted a comprehensive environmental redevelopment of the city.^[3] By draining the water-laden soils, municipal

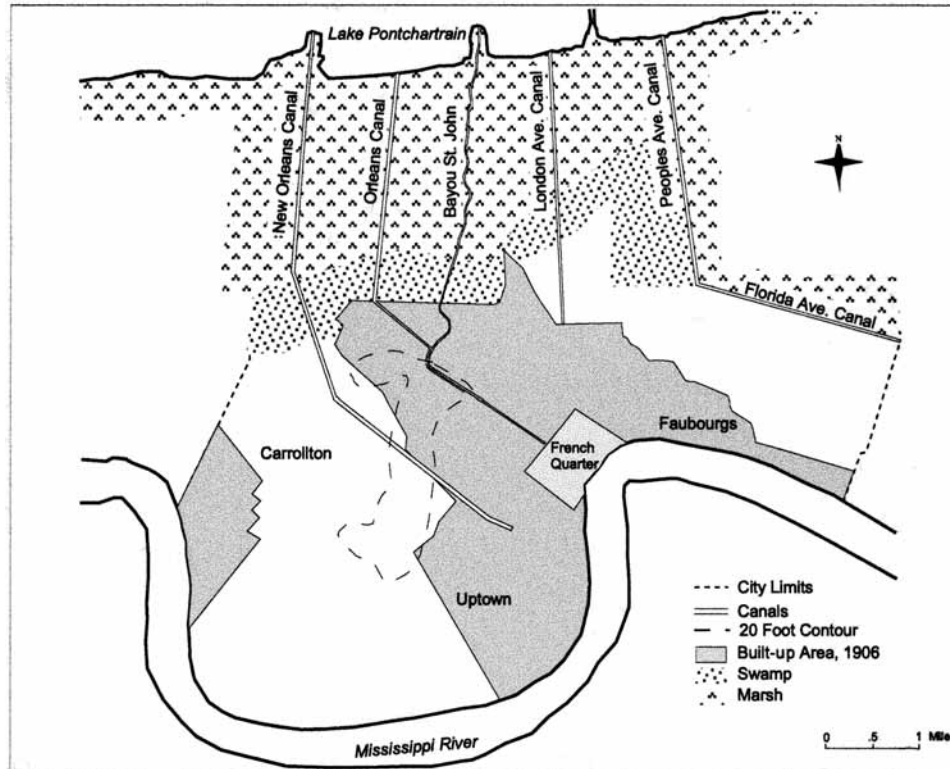


Figure 1. New Orleans built-up area and environmental conditions, c. 1906.

officials hoped to usher in a new era of public health. A Progressive Era engineering project, in theory, should have been colour blind. To effect a complete system, the entire city had to be connected to the canals, sewers, and pumping stations. Yet installation of this project took place during the height of Jim Crow policies in the South. The drainage system opened new areas for settlement by lowering the water table, while policies and real estate practices limited access to certain neighbourhoods largely to the White population. Indeed, new pumps installed in 1917 have been labelled as the agent for racial segregation in New Orleans.^[4] Sewer mains, a second component of the system, gradually and somewhat selectively followed the drainage network to all sections of the city.

This paper will investigate the design, installation, and ultimate pattern of drainage and sewerage works in New Orleans as a question of environmental equity. Carried out at a time of two powerful and countervailing forces, Progressive Era reform and Jim Crow policies, the drainage of New Orleans provides a means to investigate the *processes* that contributed to that city's racial geography and its relationship to inequitable living conditions. Reconstruction Era Blacks came to believe there was some hope for a degree of social equality. Jim Crow policies, however, curtailed these hopes. Did Jim Crow policies interfere with New Orleans' Progressive Era environmental redevelopment and thereby contribute to consequent environmental inequities? In the search for the answer to this question, this paper will invert the usual environmental equity inquiry. Rather than documenting the placement of an undesirable land use proximate to a minority population, it will seek inequity by design and installation of

a public works project or an environmental modification that was *desirable*. By identifying gaps in the system, it can more clearly document a linkage between the public project and neighbourhood populations, and thereby identify environmental inequities at the time under consideration. This method avoids the confusion of a common approach which seeks inequity in static end conditions and not in the mutually evolving patterns of residence and urban services. In doing so, the process-oriented analysis will also address the assertion that the public works were agents of segregation.

Environmental equity and the historical process

Deliberate policies forced social and environmental inequities on the African-American population in the South after Reconstruction and found expression in voting restrictions, access to public facilities, and other areas of life. Jim Crow policies imposed unfair conditions, which often took the form of residential segregation in inhospitable districts—an environmental inequity. As discriminatory practices took root in the South, Progressive Era reforms also were under way. One element of the Progressive Era reform was the development of systematic urban services, such as sewerage and water.^[5] These systems, by design, had to serve entire urban areas—to exclude one area would be inefficient engineering and could handicap the overall system. As C. Vann Woodward observed, there was a fundamental conflict between Jim Crowism and Progressivism:

The blind spot of the Southern progressive record . . . was the Negro, for the whole movement in the South coincided paradoxically with the crest of the wave of racism.^[6]

Although Progressive Era programmes sought a type of environmentalism, uplifting people by improving their environment, the exclusion of Southern Blacks illustrated an obvious desire not to elevate this segment of the population, while their inclusion often reflected a desperate attempt to prevent illnesses from spilling over from Black to White neighbourhoods.

The Jim Crow and Progressive Eras offer a starkly different view of environmental equity in Southern cities to recent studies.^[7] Long before the emergence of concern for landfills and hazardous waste sites, nuisance and 'insanitary' conditions comprised the nexus of undesirable environments. Extension of public services such as sewers and water supplies to wealthy neighbourhoods reflected the first phase of efforts to remedy environmental disamenities, and there were obvious inequities in such programmes.^[8] Progressive Era engineering projects called for city-wide systems that minimized inequities. New Orleans' poorly drained situation called for a much more thorough environmental redevelopment and hence demanded a city-wide system. Drainage made places within the city limits habitable for the first time. How well drainage and sewerage served a neighbourhood reflected the adherence of municipal officials to the tenets of progressive engineering. Lapses or delays in service delivery, on the other hand, indicate deliberate efforts to deny neighbourhoods environmental equity. The racial composition of the neighbourhoods without services provides an indication of race-based environmental inequities. To understand how this condition came to be, it is essential to trace the process of both service extension and neighbourhood demographic change.

Discussions of racial geography in the urban South have always found some degree of segregation of Blacks in the less desirable sections of cities. John Radford noted an antebellum tendency in Charleston, South Carolina, to push free Blacks towards the Neck, a neglected, low-lying area used in part as the city dump.^[9] John Kellog described the most common form of African-American residential cluster as a bottom lands

settlement near the urban boundary.^[10] Poor drainage, flimsy housing, and inadequate public services characterized such Black neighbourhoods, and typically public officials placed the blame on the residents for creating such woeful situations.^[11] Indeed, insanitary conditions became associated with the occupants and not with the physical settings of neighbourhoods.^[12] It was into these neighbourhoods and areas on the fringe of the central business area that the concentration of African-Americans increased during the early twentieth century. As the century progressed, inner-city concentrations became more common. New Orleans' racial geography, although somewhat unique, embodied many of these traits.

It was not atypical in Southern cities for public works to exclude African-American neighbourhoods. In Birmingham, financing of the sewerage system by special assessments made that service unattainable to low-income Blacks, despite pleas by health officials in the 1910s to eliminate the health menace posed by the dense concentration of privies in the Black 'quarters'.^[13] In Atlanta, extension of public works into Black neighbourhoods in the 1910s followed a public decision to finance sanitation facilities when concerns for the health of White residents who might be afflicted with disease emanating from African-American neighbourhoods came into force.^[14] Such was the conflict inherent in the Progressive Era engineering of public works in the South. Denial of services to one segment of the population could cause the entire city to suffer. Only with this recognition were cities willing to apply public funds to such projects.

Emergent Jim Crow policies stood in the way of Progressive Era reform by institutionalizing White superiority in the South and requiring segregation in most public settings.^[15] This derailed the dreams of many Blacks to achieve a measure of equality. One of the most obvious areas of segregation or unequal access were restrictions erected in real estate dealings. David Delaney makes a strong case that municipal ordinances and later deed covenants that restricted where Blacks could purchase property or live had an important impact on the spatial development of urban racial geography.^[16] Both municipal ordinances and deed restrictions played a major role in the evolving racial geography of the Crescent City during the period from 1910 to 1930 by excluding them from certain sections of town.

The academic literature indicates that the creation of Black neighbourhoods, the delivery of services to these areas, and restrictions on African-American mobility all contributed to an evolving urban landscape during the Progressive Era and Jim Crow eras. To comprehend this dynamic pattern, a process-oriented approach is necessary.^[17] Several early environmental equity studies concluded that spatial proximity of a minority population to an unwanted land use was evidence of racism.^[18] Such analyses assumed a historical decision-making process that considered race but failed to demonstrate it. Process-oriented studies have analysed the role of real estate markets in the placement of unwanted land uses and the replacement of White residents with Blacks after the creation of a hazardous waste site. Vicki Been examined the role of real estate market dynamics as the driving force behind disproportionate distribution of unwanted land uses in proximity to low-income populations.^[19] Andrew Hurley found that a contaminated industrial site existed before racial transition in a St Louis neighbourhood placed African-Americans in its vicinity.^[20] While both these studies consider the 'which came first' question, they still do not unravel the relationship among a public decision, environmental conditions, and minority communities. Real estate values and even the turnover of populations near industrial sites do not necessarily indicate concern with environmental conditions or neighbourhood residents in public decision-making. By examining the design and installation of the New Orleans drainage and sewer systems,

this study will explicitly analyse how a public body dealt with a recognized environmental problem in conjunction with known minority neighbourhoods.

New Orleans offers an ideal setting to examine the imposition of inequities on a racial group. Noted as a city with low segregation during the antebellum period, residential segregation emerged full blown during the height of Jim Crow and Progressive Era.^[21] Certainly, segregation existed to some degree in New Orleans before 1865, when the relatively large number of free African-Americans had less access to most public facilities than did Whites. There was some limited racial mixing in taverns, gambling houses, and bordellos, but there were both formal and informal restrictions against integrated activities, and they remained after the war.^[22] During Union occupation of the city, the street car companies attempted to replace the segregated interiors of their vehicles with separate cars for White and Black riders. This inflamed the African-American population and ultimately led to a reversal of the separate cars policy in 1867.^[23] Thus, there were anti-segregationist victories for African-Americans during Reconstruction in New Orleans. Indeed, residential segregation fell between 1870 and 1910, but this trend reversed itself by 1920.^[24] This suggest that post-bellum policies deterred dense residential clusters of Blacks, but that Jim Crow policies altered that pattern. Yet by 1890, census figures indicate that some wards exhibited higher than average concentrations of black residents. Thus, at the time when Progressive Era engineering and Jim Crow policies began their transformation of the urban South, New Orleans had definable African-American neighbourhoods. At least two processes contributed to subsequent segregation: (1) systematic re-engineering of urban public works and (2) methodical deprivation of equal treatment to one racial group.

Drainage and neighbourhoods

New Orleans occupies a site shaped by a sweeping meander of the Mississippi River. Before levee construction, floods regularly delivered huge amounts of sediment-laden water to the floodplain lining the river. As water escaped the river channel, it slowed, allowing coarser sands and sediments to settle near the channel. This process created a band of higher, well-drained ground, known as the natural levee, adjacent to the waterway—about 15 feet above sea level in New Orleans. Flood waters deposited finer silts and clays farther from the channel, ultimately creating muddy back swamps, with a sizeable area about 1.5 feet below sea level (within the ‘20 foot contour’, Figure 1).^[25] Discontinuous ridges, relict natural levees created by ancient river courses, stretched across the rear of the nineteenth-century city—about 5 feet above the lowest ground—separating the city from Lake Pontchartrain. Bayou St John flows through the subtle ridges delivering urban run-off from the natural levees to the lake. The overall topography of the city forces water to flow away from the river, towards the brackish Lake Pontchartrain, but the absence of slope and the intervening ridges created a massive wetland between the city and the lake. An 1860s plan to drain the city described the situation:

It would be difficult to find a location where the natural drainage is worse than that of New Orleans, owing to a want of declivity in the land, and the tenacious nature of the soil; yet the problem is easy of solution and presents few difficulties, when we come to apply artificial means, aided by the science and practical knowledge of modern times.^[26]

Residential segregation was a part of New Orleans’ racial geography, although it was less obvious on a city-wide basis in the Colonial and Antebellum periods since most

slaves lived near their owners. However, New Orleans had a sizable free Black population before 1865 and they had greater flexibility in residential choices than many of their rural counterparts. During the early American period, horseshoe-shaped clusters of African-American residences partly encircled the French and American districts which were bisected by the Canal Street business area. Towards the rear, or low area, truck and dairy farms operated. By 1850, European immigrants had displaced most of the Black population near the riverfront of the American sector and pushed them towards the rear or poorly drained sectors.^[27]

During the nineteenth century, several private drainage companies constructed canals flowing into Lake Pontchartrain to augment the sluggish Bayou St John and enhance the movement of run-off towards the lake (Figure 1). Several rudimentary pumps aided natural flow towards the lake, but the pre-1890 system was unable to keep pace with the average rainfall of 60 inches a year, let alone major downpours. These private enterprises alleviated water-laden conditions in the best drained areas, but they were far from adequate to lower the overall water table behind the natural levees. Indeed, the drainage canals, with little natural flow, became “beds of garbage and excrement, fit only to generate fever and breed mosquitos”.^[28] An 1880 Louisiana Board of Health report described the imperfect state of drainage. Only the Carrollton section received favourable comments about its drainage. Situated near the upper end of the crescent, Carrollton is on a slight rise formed by crevasses (places where the river broke through the natural levee and enlarged the higher ground). New Orleans residents considered this area a healthy location where they sought summer entertainment. Many African-Americans lived in this suburban area which had an over 50 per cent Black population (nearly double the percentage in other sections). The report characterized the main business district and the French Quarter as poorly drained and subject to floods following rain. Likewise, the downstream faubourgs or neighbourhoods were locations of “great nuisance” and the “greatest sanitary evil” owing to ineffective drainage, and they had only 25 per cent Black residents. Even the fashionable Garden District had a large number of low lots and “defective drainage” in its rear or lakewards sections. A narrow neighbourhood that straddled the 20 foot contour (marking the lowest part of town), also received critical comments in terms of periodic flooding.^[29] This portrait, on the eve of the great drainage overhaul, reveals the relationship of topography to drainage and the related perception that poor drainage was a scourge to the residents’ health.

In addition to drainage of rain and flood waters, the city residents largely relied on privies for sanitation. An 1879 report claimed the privy system was “the most important and most difficult problem connected with the sanitation of New Orleans”. Its authors, a committee of physicians, calculated that New Orleans’ residents deposited over 2 million pounds of human ‘excreta’ to the soil annually. According to the 1880 health survey, New Orleans had 39 932 premises and over 44 000 privies. Of these, inspectors declared that over half were “foul” or “defective”. These devices introduced sewage into an already saturated ground, and health officials claimed they contributed to poor health in the city.^[30] Only the Algiers (west bank) and Carrollton districts had relatively low percentages of foul privies. This meant that the areas of greatest population density and lowest ground relied on largely ineffective land disposal systems. In their concern over these offensive conditions, the physicians called for a sewerage system to transport the human waste to the middle of the Mississippi River.^[31] Reliance on cisterns for potable water, rather than wells, provided a small measure of protection for the residents’ health.

Drainage plan

After decades of piecemeal drainage projects seeking “to benefit small disconnected sections” of town, the New Orleans Common Council appointed an engineering committee in 1893 to develop a systematic plan for relieving soggy conditions. The timing of this effort and its public acceptance reflected several related circumstances. Firstly, New Orleans’ leaders embraced Progressive Era notions that major engineering works could remedy public health problems. Secondly, the city had recovered sufficiently from its Reconstruction Era debt to convince voters to take on this expensive challenge.^[32] Thirdly, a major flood in August 1894 galvanized public support to follow through on the ambitious plan.^[33] With public backing, the engineering committee took on its mandate to control surface run-off and sewage. The city council expressed concern that many areas were unoccupied because “they are practically swamps” and therefore were impediments to urban growth and prosperity. Furthermore, these swampy tracts contributed to “unsanitary conditions”, likewise frustrating economic growth. In response to these dual concerns, the engineers proposed that “a drainage project should therefore be extended to *all territory* [emphasis added] which is now, or will be, built up in a reasonable time, and it should effect the removal of rain and ground water from the same, so that the whole area can be made and kept thoroughly dry”.^[34] Sanitary improvements, even in areas occupied by Blacks, would serve the entire population by reducing the threat of disease and thereby enhance economic opportunities.

At the time, the built-up area was much smaller than the territory within the city limits (Figure 1). There was a residential and commercial enclave on slightly higher ground at the river bend known as Carrollton. Moving downstream, below Audubon Park, the site of the 1884 world exposition, there was relatively sparse development along the natural levee. Closer to the central business district, denser settlement resembled a triangle with its base on the French Quarter and its apex near the headwaters of Bayou St John. Parallel drainage canals enabled a lakeward extension of urban land uses behind the business district. Encircling the business district and in the sweeping bend of the crescent, which later became ‘uptown’, dairy farms and other rural, wetland-tolerant land uses existed.^[35]

The drainage plan sought to utilize the power of gravity, as much as possible, to remove water. This meant enlarging the existing canal system and adding new drainage courses that would move water away from the natural levee along the river, through low areas, towards their ultimate outlets. Two viable points of discharge existed: Lake Pontchartrain to the north, where the existing piecemeal system released its flow, and Lake Borgne, a shallow tidal bay east of the city (Figure 2). Fearing pollution of Lake Pontchartrain, near the lakefront entertainment district, the plan called for a series of canals and pumps to intercept water flowing through the old canals and transport it eastwards into a new canal emptying into Lake Borgne and the adjoining uninhabited wetlands. According to the authors, “the proposed plan thus provides for thorough drainage of every part of the city”.^[36] Evident in such a statement was the explicit desire to implement a complete system, based on rational engineering principles. After all, if the drainage plan excluded one segment of the city, unhealthy conditions would persist, denying Whites economic opportunities and nullifying the plan’s benefits.

The lack of gradient posed a substantial challenge to the engineers. Although the slope along the back side of the natural levee was sufficient to move water into the main canal, the almost imperceptible grade to the lake offered little head. Along the 7 mile length of the main canal, the fall was only 2 feet, and at times Lake Borgne’s tide

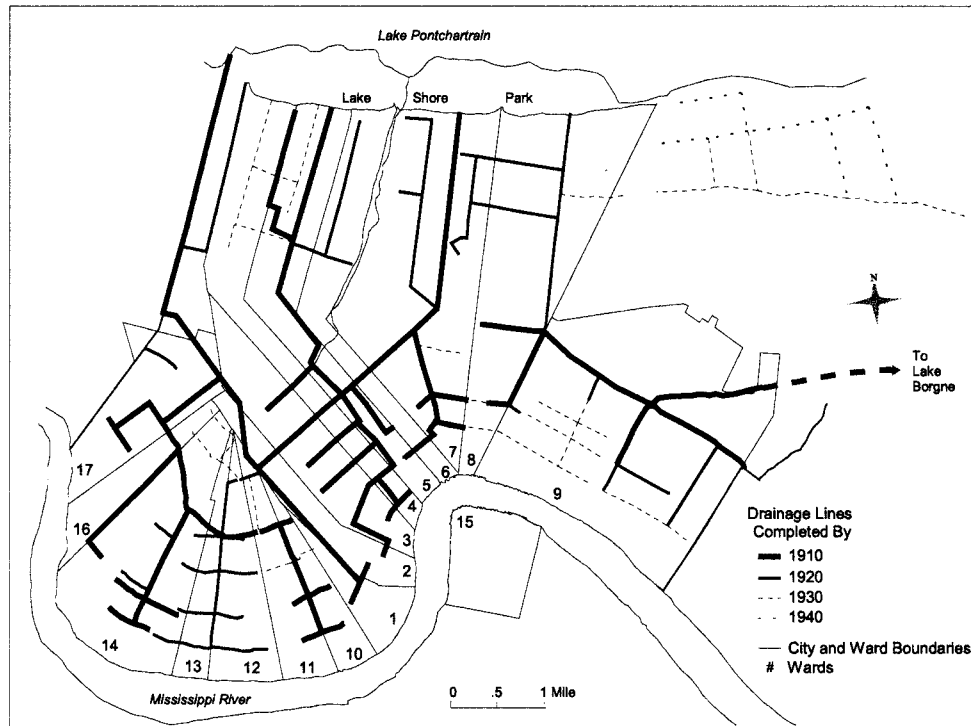


Figure 2. New Orleans drainage system installation, 1910–1940. Source: New Orleans Sewerage and Water Board, *Semi-Annual Reports*, 1910–1940.

and storm influenced level could be higher than the canal, thereby requiring pumps to force the water through the canal. To handle excess storm run-off, the pumps would divert a portion of the flow to a second set of relief canals equipped with their own auxiliary pumps, to push the overflow through the ridges towards Lake Pontchartrain (planners expected the highly diluted sewage carried in the storm run-off not to create unpleasant conditions at the lakefront discharge points). Excessive rain could overwhelm the system and cause localized flooding in the low areas. Thus, despite a system designed to drain the entire city, the naturally low areas remained vulnerable to inundation following exceptional rainfalls.^[37]

The plan could not be implemented in its entirety, at least not immediately, and the engineers set priorities and developed a sequence for constructing components to the system.^[38] Consequently, the gradual installation took decades to complete. The engineers argued that the downtown section, owing to “the concentration of improved properties, paved streets and business houses, and of its central position in reference to the most densely inhabited area of the city, is now more urgently in need of improved drainage than other localities”.^[39] Yet the New Orleans Navigation Canal and the Carondelet Canal, which terminated at Basin Street, bordered this district and already provided better drainage than was available to the rest of the city. The rear of the business district was low and largely unsettled (an indication of poor drainage), and the Board’s map also suggested that the uptown area had incomplete drainage and thin settlement, as did the downstream faubourgs. The planners, by calling for the first drainage improvements in the central business district, were serving the business elite, but the

residential population of this section was more than 30 per cent African-American—above the city average. At its outset, the plan did deny service to emergent Black neighbourhoods.

The second component of the system handled sewage. George Earl, Superintendent of the Sewerage and Water Board (S&W Board), described the horrendous conditions on the eve of construction:

Fecal matter is deposited in shallow open pits with porous bottoms. Some of these are partially emptied occasionally by sanitary excavating companies who transport their contents in barrels to a point below the city limits and dump it into the river . . . When, however, water closets are connected either to these vaults or to cesspools sunk deeper into an already saturated soil, then trouble begins and constant emptying at considerable cost discourages the owner, who finally constructs shallow drains near the surface, into the surrounding soil, or a more direct, though unlawful, way allows overflow into an open gutter . . . All kitchen, laundry, bath and other liquid household wastes go direct to surface gutters through flat and shallow alley gutters or pipe lines, and are what render the New Orleans gutter the reproach it is, which only a sewerage system can relieve.^[40]

In order to use the diluting power of the Mississippi River, the sewerage plan called for replacing the old drainage canals with pumps that would force domestic effluent through closed pipes up the natural levee and into the river at a discharge point below the city. At the outset of the sewerage system construction, the old open drainage canals handled much of the sewage, either directly or by way of seepage from the vaults. In discussions about the new system, officials reasoned that separate sewer lines could be installed more expeditiously and thereby benefit the existing built-up area in less time.^[41] There were obvious benefits in the combined effect of the surface drainage and the diversion of sewage from the land sink to the Mississippi River. Of central importance was the seemingly unlimited ability of the Mississippi River to assimilate and dilute sewage.

System progress and segregation

The first phase of construction introduced improved drainage to the high-value business district and adjoining residential areas. One main canal, with several feeders, drained the Basin Street district into the new outfall canal that emptied into Lake Borgne (Figure 2). Another, unconnected series of canals drained the upstream portion of the business area, the Garden District, and the low ground near the centre of the crescent. The initial drainage effort encompassed two wards with higher than average African-American populations. By all appearances, drainage construction up to 1910 followed basic engineering principles: address the high-value sections of the city, provide attachments for the low areas, and install the initial arteries for a comprehensive system. An optimistic annual report in 1910 noted that heavy rains caused flooding in areas not yet served by the system, but touted that “there was no flooding in any portion of the city where the drainage canals and drain pipes have been completed”.^[42] Drainage service encompassed 22 000 acres by 1910.

Officials hailed the dramatic decrease in malaria deaths attributed to the elimination of soil moisture (and mosquito breeding sites). According to the Sewerage and Water Board, improved drainage drove the malaria death rate down for all residents from 104 per 100 000 to 8 between 1900 and 1912. Yet the death rate among Blacks remained much higher than for Whites, suggesting a lingering disparity between services offered to the racial groups.^[43] Malaria and typhoid both claimed more Black victims per capita

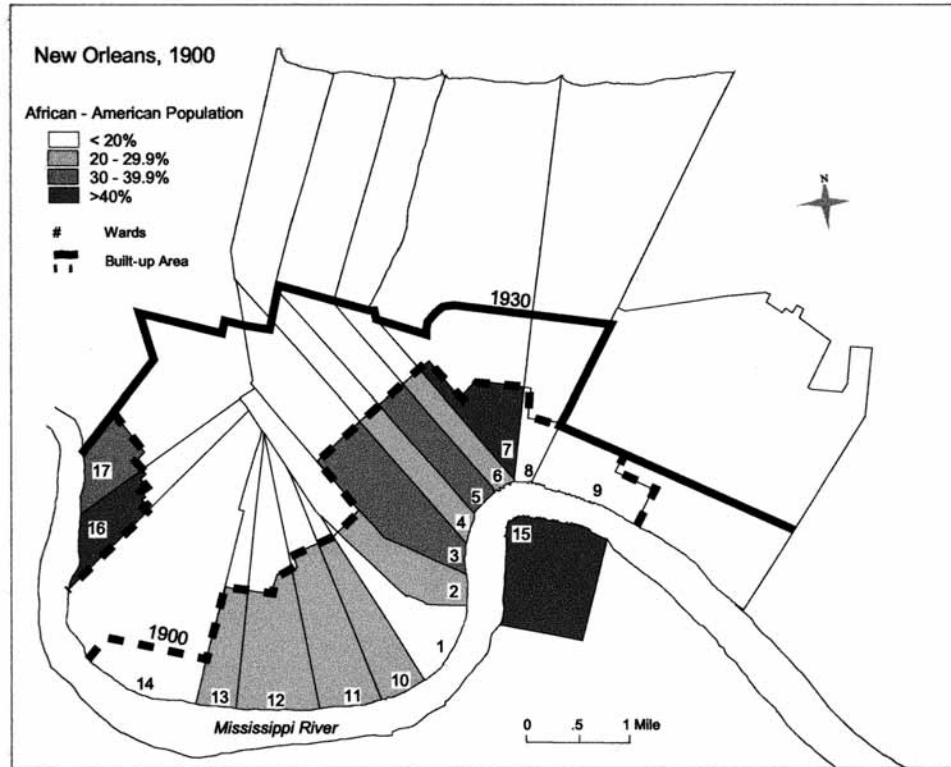


Figure 3. African-American population in New Orleans, 1900. Source: US Census.

in 1907.^[44] In keeping with prevailing medical views, public health authorities placed the blame for these rates on African-Americans: “Improvement in the colored death rate has been retarded by the reckless and improvident ways of the race and their utter disregard of all hygienic and sanitary laws”.^[45] Despite this racist assignment of fault, the systematic delivery of drainage produced the most pronounced benefits, at least initially, among White residents.

The place to find a service gap was the sewerage system. Up to 1910, progress was sporadic and limited largely to built-up areas “where the property holders have petitioned for the laying of sewers, pledging to connect with the same within six months after they are laid”. Connections to the sewerage system required a deposit of either \$25 or \$50 and thereby limited access to property owners with the resources to pay the fee. Only 9036 premises, of more than 40 000, had connections by 1910. The connection fees left many low-income households, whether rental or owner occupied, without a sewage service—and this included many African-American residences.^[46]

Between 1900 and 1910, some slight population adjustments occurred. The African-American population in the eleventh ward reached 30 per cent, indicating higher than average concentrations (Figures 3 and 4). Two churches serving Black concentrations place the core of this neighbourhood in the lowest portion of the ward.^[47] This reflects the expansion of Blacks into the previously uninhabitable low areas to the rear of this ward. Both the seventh and sixteenth wards remained above the average concentration of Black residents. The seventh ward was a triangle of land downstream from the French Quarter, situated near the emerging ‘main street’ for the African-American

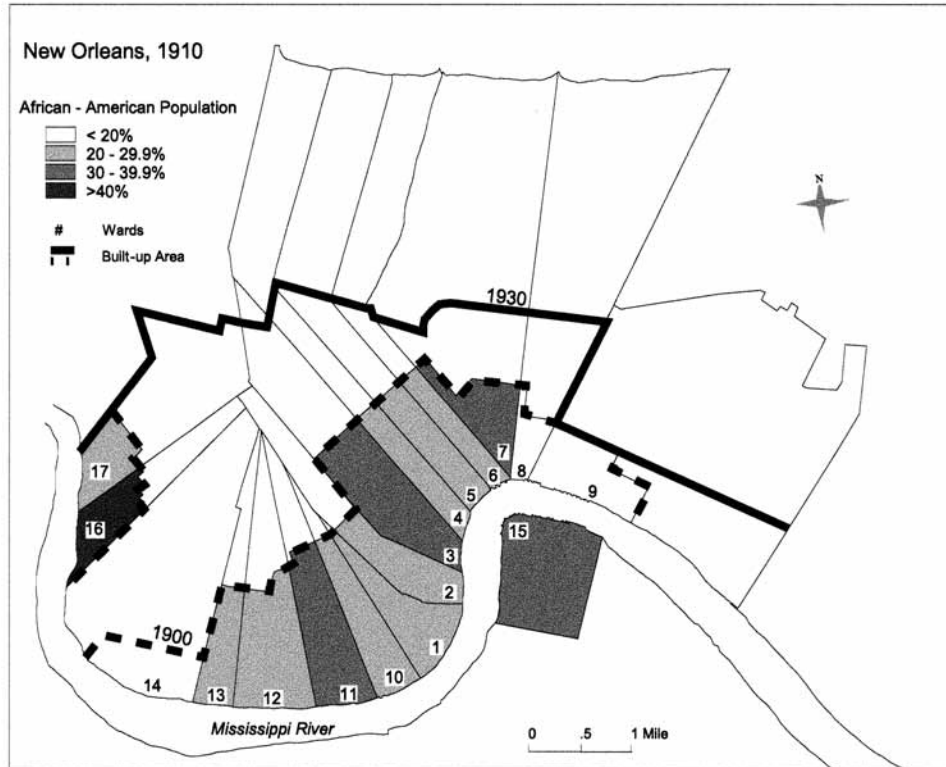


Figure 4. African-American population in New Orleans, 1910. Source: US Census.

community. The sixteenth ward was adjacent to Carrollton which stretched from the well-drained natural levee back towards swampy areas. Black congregations had churches at the fringe of this area, fronting on undeveloped wetlands.^[48] African-American clusters in both wards were adjacent to commercial sectors and also higher value residential areas. Absolute increases in Black populations in these wards reflected an expansion of residential areas into the formerly poorly drained areas opened by the first phase of drainage.^[49]

The drainage system reached more corners of the built-up area between 1910 and 1920 (Figure 2), but it was inadequate to handle large downpours. Four and a half to six inches of rain in May 1912 left much of the low area near Broad Street (within the 20 foot contour) inundated owing to the inability of the pumps to keep up with precipitation.^[50] To address this shortcoming, the Sewage and Water Board put new pumps in place in 1917. Installation of the new pumps, which operated with greater efficiency and enabled speedier removal of rain water, substantially lowered the water table. This affected both the newly served territories and particularly the lowest areas of the city within the 20 foot contour. Operation of the more efficient pumps boosted system capacity from 3.2 to 7 billion gallons per day.^[51] Despite the benefits provided by the new pumps, heavy rain and budget problems hindered progress and forced a near cessation of construction and maintenance between 1916 and 1919. Nevertheless, by 1919, the Sewerage and Water Board claimed that the system was draining nearly all the built-up areas, and, as a result, death rates from typhoid had dropped from 38

per 100 000 in the decade 1900 to 1909, to 13 in 1919, and to 7.5 by 1920.^[52] Blacks still succumbed to typhoid at a higher rate. In 1915, the Louisiana Board of Health reported a death rate per 100 000 of 20 for Whites and 31 for Blacks.^[53] The total area served by the drainage system increased from about 22 000 acres in 1914 to 30 000 in 1925. However, progress was not consistent across the urban territory. Notable were undrained pockets within the lowest area uptown, a largely Black residential area, and in a section of the downstream faubourgs, populated predominantly by Whites.

Having connected only 20 per cent of residences to the sewer system in 1910, and with concerns that privies still posed a serious health threat, the Sewerage and Water Board reassessed its connection fee process. After securing new funding from municipal improvement bonds, the board removed the sewerage connection fee in 1911. This increased the pace of connections, but the board desired to accelerate the pace further, lamenting that less than a third of households had service:

A great sanitary benefit to the city at large is thus being operated at a heavy cost in proportion to the number of premises served, for it costs no more to serve twice as many premises as it does those now connected, and the disgusting nuisance of overflowing cesspools and household wastes being discharged into the gutters, and manufacturing wastes being discharged into the canals, continues.

To alleviate these conditions, the board resolved in 1911 that homeowners would face a fine if they did not accept connections and close cesspools and privies.^[54] In 1912 the board had teams installing connections at its own expense, and the success of this programme was obvious. The 1912 annual report indicated that over 28 000 premises had connections to the sewerage system and, without a restrictive fee, it had become more equitable in its distribution.^[55] As of 1917, about 70 per cent of all premises had connections to the sewerage system, and by 1920 the figure climbed to 94 per cent.^[56] This reflected both the additional mileage of sewer lines (513 miles) and the continued efforts of the S&W Board to provide linkages to its system.^[57] Undoubtedly, some houses without indoor plumbing remained unserved, particularly in Black neighbourhoods.

As might be expected, sanitary conditions for Black and White populations remained highly skewed. For New Orleans residents as a whole, the typhoid death rate per 100 000 was 20.4 for Whites and 31 for Blacks in 1918, although officials suspected serious under-reporting among the latter group. A major health survey in 1919 concluded that the highest death rate existed in wards 1, 2, and 3, which had sizable Black populations.^[58] Lingering shortcomings in the drainage and sewer system contributed to the high death rate combined with aspects of the city's morphology. Four wards stand out in the 1920 census with above-average black concentrations: the second ward, behind the business district, the tenth and eleventh wards, to the rear of the Garden District, and the seventh ward, below the French Quarter (Figure 5). Both the second and tenth wards moved above the city-wide average, and the eleventh ward topped 40 per cent. Drainage, albeit only marginally successful after a heavy rain, of the lowest portions of these wards opened them to Black residential development, and population increases reflect occupation of the rear or low areas (Figure 2). White residential and commercial land uses dominated the higher, riverward, sections of these wards. Additionally, the lakeward segments of the wards had converging streets, and consequently many smaller lots, which could have accounted for a higher population density. Sanborn maps indicate that many of the smallest lots were unoccupied in the early 1920s, but that some of the larger lots had multiple residences.^[59] Crowding in the emerging Black neighbourhoods and some residual privy use, coupled with conditions

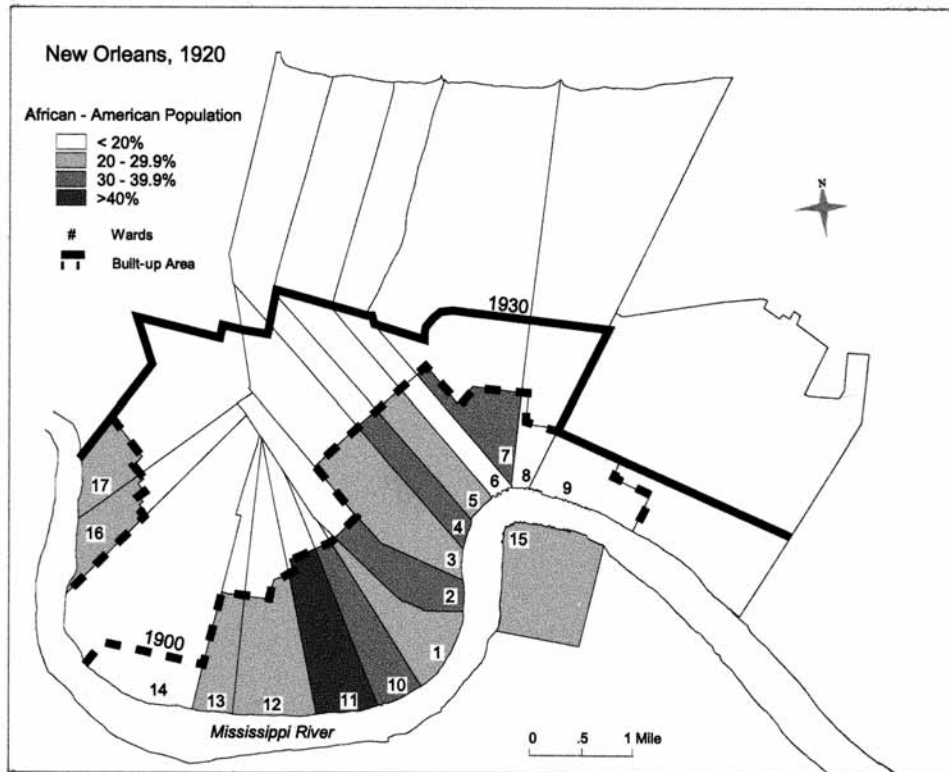


Figure 5. African-American population in New Orleans, 1920. Source: US Census.

that still permitted periodic flooding after heavy rains, along with poverty, obviously contributed to poor public health. Thus, the street pattern and the small lot sizes made this area less desirable for mobile Whites and concentrated Blacks in a relatively small area.

The drainage system reached few new sections of the city during the 1920s (Figure 2). The main canals had been dug and connected in the first two decades and the Sewage and Water Board focused on enlarging and lining the existing canals, installing subsurface drainage along with street paving efforts and general maintenance. Deficiencies remained in the system, however. The canals and pumps were up to the test of a 7 inch rainfall in February 1927, but a record rainfall of 14 inches on April 15 overwhelmed the system. One of the generators providing power to the pumps burned out and reduced the capacity of the system by 40 per cent. This caused “severe general flooding in the low areas of the city for periods of twenty-four to forty-eight hours”.^[60] Newspapers reported severe flooding along Claiborne Avenue and in the mid-city area—both low areas with large Black populations. Charges of an inadequate drainage system followed these extreme events.^[61] In response, the S&W Board installed new drainage lines in one of the lower faubourgs that had been leapfrogged in previous decades and was a largely White neighbourhood by this time.^[62] In addition, portions of the area within the 20 foot contour also finally received drainage service. Thus, by 1930 the drainage system was providing service to the bulk of the built-up area and with little remaining evidence of neglected neighbourhoods.

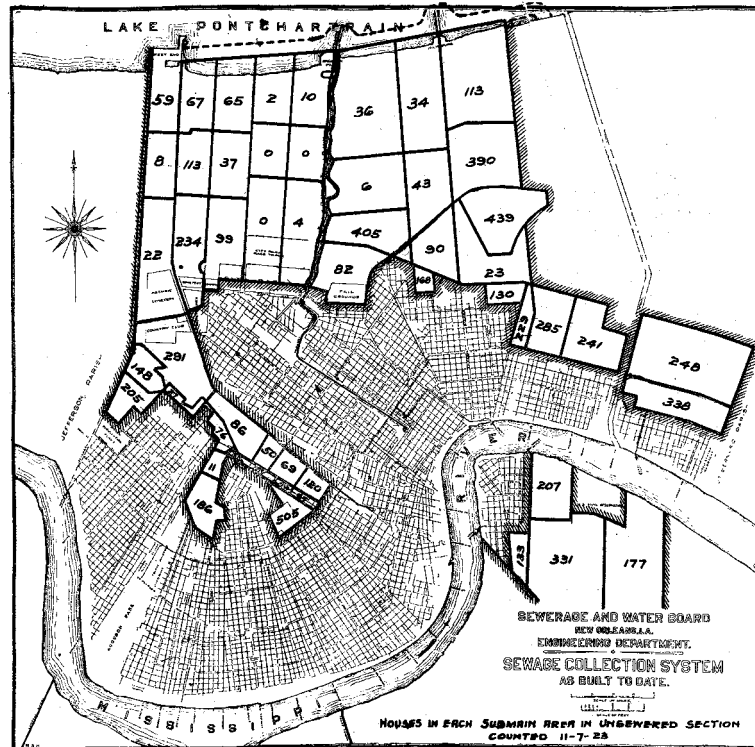


Figure 6. Areas without sewers, 1923. Source: New Orleans Sewerage and Water Board, *Forty-Eighth Semi-Annual Report*, 1923.

Although the Sewerage and Water Board sought to install a comprehensive system to serve the entire city, there were gaps that were most apparent in the sewerage system. In 1923, the Board claimed that 92 per cent of the city's population had access to sewer lines, but the unsewered territory was equal in size to the entire area already served. The unsewered tracts, most of which were sparsely settled, had an insufficient tax base to underwrite service extensions. Officials desired to encourage full residential and commercial development of the areas already served before expanding the system. Yet, even within the older built-up area, there were obvious unserved neighbourhoods. In particular, the newly drained backswamp on the lake side of the natural ridges and some of the backswamp areas behind the faubourgs had not received adequate sewer service. In addition, a pronounced, albeit small, area existed in the lowest portion of the city where Black populations were on the rise (Figure 6). Over 1800 houses were 'unsewered', meaning that they still relied on the soil or surface drains to handle domestic wastes.^[63] This is the same section with small lot sizes, poor drainage, and overall higher population densities, plus industrial land uses. Corresponding to poor sanitary services, public health statistics continued to portray a troubling situation for African-Americans. In 1926, the State Department of Health reported a typhoid death rate for Blacks at 42 per 100 000, while the White rate had dropped to 13.^[64] Although death rates by ward are unavailable, the racial differences are obvious. The lapse in sewer service delivery to this low-lying largely African-American area suggests that Jim Crow perhaps deflected engineering efficiency.

The near-complete absence of Blacks in the newly drained territory on the lake side of the ridges points to a prejudicial real estate system more so than the pumps which have been identified as agents of racism.^[65] The New Orleans City Council passed an ordinance in 1924 that effectively separated White and Black residential neighbourhoods, based on a 1912 state act that authorized the city to withhold building permits for Blacks in White neighbourhoods and a 1924 act that prohibited Blacks from establishing a residence (rental or purchase) in a White community.^[66] The ordinance fossilized prevailing racial settlement patterns and enabled developers largely to determine which racial group they would sell to. When challenged, the State Supreme Court initially upheld the ordinance in 1926 for lack of a specific complaint.^[67] Although ultimately overturned by the US Supreme Court in 1927, the ordinance prefaced later reliance on deed covenants to restrict racial integration in new neighbourhoods.^[68] Beginning in the 1920s, developers in the recently drained sections towards the lakefront imposed restrictions through deed covenants. The New Orleans Swamp Land and Reclamation Company sold a sizable parcel of land in the lakefront area to an individual developer and stipulated that no houses valued less than \$3000 could go into the neighbourhood. They also specified “no lots are to be sold to negroes or colored people”.^[69] Andrew Stafford, the developer, included the following restrictions in his deeds when he resold this property: “No person not of the Caucasian race shall be permitted to reside or congregate in any structure erected on said property, or any part thereof. This restriction shall not apply to domestic servants living on their master’s premises”.^[70] As worded, Stafford’s restrictions applied both to owners and renters. The deed covenants in New Orleans held up sale of selected properties to Blacks into the 1940s, while economic restrictions created class boundaries.^[71] Drainage may have opened new neighbourhoods, but restrictive real estate practices closed them to specific groups. The builders and realtors sought the more affluent White buyers and developed neighbourhoods for them. Although there were post-World War II developments for African-Americans in the lakefront area, they were small compared with the extensive tracts opened for Whites.^[72]

The public works programme was not without race-related inequities. Delayed sewerage connections reflected a low-priority status for Black neighbourhoods on the S&W Board’s work schedule. Provision of service to African-Americans progressed at a moderate pace during the 1920s, in part owing to efforts to keep up with an expanding city. In 1920, the S&W Board claimed that 94 per cent of premises in the city had links to the sewer system. Although crews continued to expand the system, the percentage of premises connected fell to 93 per cent by 1923.^[73] It remained at that level until 1927, although there were over 715 miles of sewer mains in place and 68 784 total connections.^[74] By 1932 the number of connections had risen to 75 271.^[75] The fact that the percentage of premises with connections remained steady indicates that the S&W Board was keeping up with new construction but little more during the 1920s.

More pronounced residential segregation appears by the time of the 1920 census (Figure 7). Three uptown wards had African-American population concentrations above the city average—indeed, the second and eleventh wards had more than 50 per cent Black residents, with about 40 per cent in the tenth ward. By this time, several neighbourhoods showed a greater concentration of Whites—the fourteenth ward uptown and the faubourgs below the French Quarter (eighth and ninth wards) all had more than 80 per cent White residents. Despite apparent links to the sewer system, the ninth ward remained poorly served according to the frequency of complaints made by local residents to the city council.^[76] Most newly opened

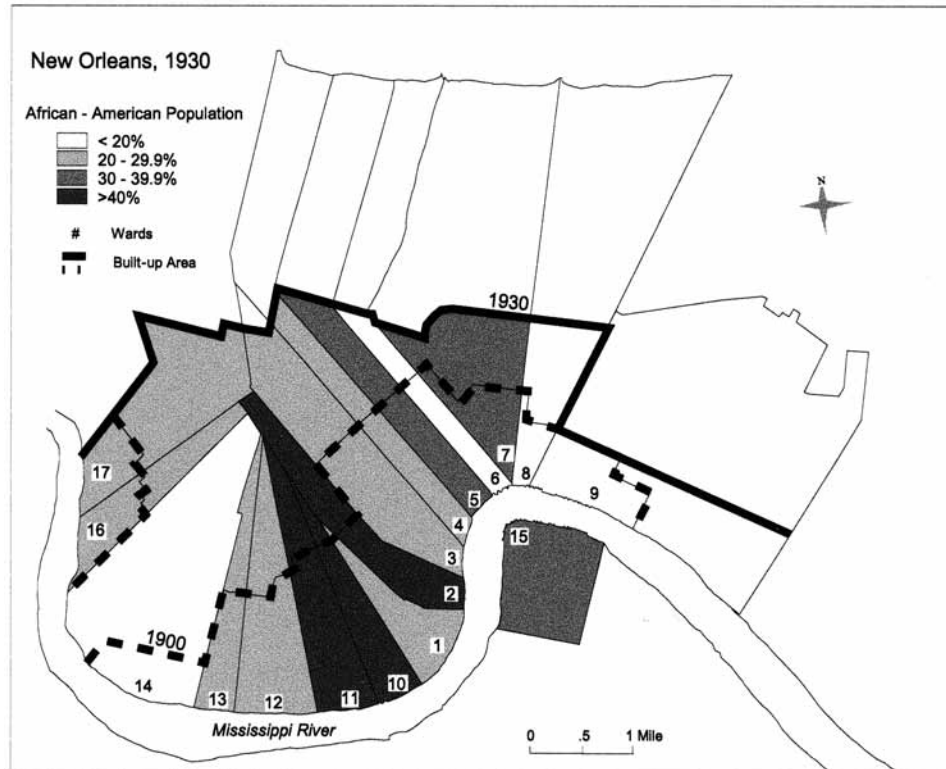


Figure 7. African-American population in New Orleans, 1930. Source: US Census.

neighbourhoods in the lakeward development were almost exclusively White. Yet the low ground (near the 20 foot contour), near the point of convergence of the streets that radiated outwards towards the sweeping bend of the river, were becoming predominantly Black neighbourhoods. Industrial and transportation land uses occupied large portions of this area as well.

Conclusions

Congo Square was the centre of Black New Orleans in 1890, but by 1930 African-Americans had made the low area within the 20 foot contour a major residential neighbourhood. The New Orleans drainage system had contributed to this and other population shifts by lowering the water table and improving public health. While the initial system design called for equal service throughout the city, and ultimately the Sewage and Water Board achieved this objective, there were race- and class-related inequities in the course of construction. From the outset, however, design and construction encompassed African-American neighbourhoods—a function of rational engineering principles eclipsing racist tendencies of the Jim Crow Era. Indeed, the first phase of construction included drainage services to a Black neighbourhood on the fringe of the central business district. During the 1910s and 1920s, the drainage works permitted further development in the low areas uptown, where important African-American neighbourhoods evolved. Sewerage connection fees provided exclusionary for low-income families, which included many Blacks, but the Sewerage and Water

Board dropped the fees and made connections mandatory in 1911. This obliterated inequities, at least in design and policy. Progressive Era sanitation principles, and concern among White planners that poor sanitation conditions in Black neighbourhoods imperiled residents' health city-wide, overrode racist tendencies.

Despite plans systematically to drain the city, gaps in the system became apparent in the 1920s. A 1923 assessment of the sewerage system exposed a sizable neighbourhood without sewer mains. This area lacking service was a low-lying, largely African-American and industrial district. Additionally, serious flooding caused by intense rainfall left much of the sector under water for up to 48 hours in 1927. Thus, both sewerage and drainage were either unavailable or ineffective in this low district. Public appeals for remedies ultimately led to improvements by 1930. A downstream faubourg with a predominantly White working-class population endured similar delayed service delivery, demonstrating that environmental inequities were not solely based on race. The drainage and sewerage system eventually reached a city-wide distribution with little apparent race or class bias. This does not mean that the city achieved environmental equity, but it indicates that rational engineering was prevailing over racism in terms of public works.

Racial segregation, however, progressed during the first three decades of the century. The first population realignment in response to drainage was the expansion of Blacks into low-lying areas to the rear of the city. Drainage appears to be a principal agent in this adjustment. City ordinances and later deed restrictions were the primary agents of residential segregation towards the lakefront. While they may not have caused segregation, they legally obstructed desegregation. Vast tracts of lakefront property drained after 1920 became entirely new subdivisions, and ordinances and racially restrictive deeds effectively closed them to African-Americans.

Low sections, such as Basin Street and the area within the 20 foot contour, stand out as Black neighbourhoods by 1930. This pattern resulted from a process that occurred in conjunction with, but not as the sole consequence of, the public works extension. In a time of overt and legally sanctioned racism, segregation accelerated. However, neither the drainage nor the sewerage system was the exclusive cause. Although inequities existed in the installation of these systems in the 1920s, the Sewerage and Water Board tried to correct them. Thus, ultimately the entire city received comparable service. At the same time, institutionalized segregation policies embedded in the real estate system were instrumental in shaping New Orleans' racial geography, although other factors such as economics and urban morphology played important roles. Despite the influence of racism, the public works programme followed Progressive Era engineering principles and Jim Crow emerged through overt real estate policies. A process-oriented analysis clearly shows that drainage opened new areas to Black residences. In this respect, drainage contributed to segregation. Allowing African-Americans to occupy these low areas reflected established patterns of turning low-value land associated with environmental problems over to minority populations. The development of lakefront property required drainage, but limiting sales to Whites was a function of real estate practices.

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Notes

- [1] P. F. Lewis, *New Orleans: The Making of an Urban Landscape* (Cambridge 1976). An entire glossary is necessary to comprehend relative location in New Orleans. High ground is along the river, low ground occurs between the river and the lake or to the rear. Uptown refers to upstream and downtown refers to downstream.
- [2] S. Cutter contends that environmental equity “is a broad term used to describe the disproportionate effects of environmental degradation on people and places.” Here it will also be used to describe circumstances that deny people and places environmental improvements. See Susan Cutter, Race, class, and environmental justice, *Progress in Human Geography* **19** (1995) 111–22. Quote is from p. 112.
- [3] The concept of environmental development was presented in C. M. Rosen, *The Limits of Power* (Cambridge 1986). She presents three elements of the process: “(1) the economic and population growth stimuli provoking land use change, (2) the adaptive environmental change necessitated by the stimuli, and (3) a wide variety of fractions that mediated this stimulus–response relationship” (p. 6). This work will focus on environmental change.
- [4] D. Spain, Race relations and residential segregation in New Orleans: two centuries of paradox, *Annals American Academy of Political and Social Science* **441** (1979) 82–96. Spain cites Lewis, *op cit.*, 62, who acknowledged that Jim Crow Era policies acted in concert with the drainage system.
- [5] For discussions of late-nineteenth-century public works, see J. A. Tarr, The separate vs. combined sewer problem: a case study in urban technology design choice, *Journal of Urban History* **5** (1979) 308–39; J. A. Peterson, The impact of sanitary reform upon American urban planning, 1840–1890, *Journal of Social History* **13** (1979) 83–103; S. K. Schultz and C. McShane, To engineer the metropolis: sewers, sanitation, and city planning in late-nineteenth-century America, *Journal of American History* **65** (1978) 389–411.
- [6] C. V. Woodward, *The Strange Career of Jim Crow*, 3rd edition (Oxford 1974) 91.
- [7] S. Cutter, Race, class and environmental justice, *Progress in Human Geography* **19** (1995) 111–22.
- [8] J. Jackson, *New Orleans in the Gilded Age: Politics and Urban Progress, 1880–1896* (Baton Rouge 1969); C. Harris, *Political Power in Birmingham, 1871–1921* (Knoxville 1977); L. Cain, *Sanitation Strategy for a Lakefront Metropolis: The Case of Chicago* (Dekalb 1978).
- [9] J. Radford, Race, residence, and ideology: Charleston, South Carolina in the mid-nineteenth century, *Journal of Historical Geography* **2** (1976) 329–46.
- [10] J. Kellog, Negro clusters in the postbellum south, *Geographical Review* **67** (1977) 313–21. In a detailed analysis of small towns, M. Newton found similar patterns, Settlement patterns as artifacts of social structure, in M. Richardson (Ed.), *The Human Mirror* (Baton Rouge 1974).
- [11] B. A. Brownell, The urban south comes of age, 1900–1940, in B. A. Brownell and D. Goldfield (Eds), *The City in Southern History* (Port Washington 1977).
- [12] In the South as elsewhere, racism often targeted the ‘insanitary’ conditions of Black neighbourhoods as a reason to keep them segregated. For a discussion of the emergence and perpetuation of ideas about race and sanitation, see K. Anderson, The idea of Chinatown: the power of place and institutional practice in making of a racial category, *Annals of the Association of American Geographers* **77** (1987) 580–98. Mexican-Americans received similar criticism in Los Angeles, S. Sidawi, Planning environmental racism: the construction of the industrial suburban ideal in Los Angeles County in the early twentieth century, *Historical Geography* **25** (1997) 83–99. By 1914, Louisiana officials had charged that Whites were responsible for poor health in the Black population. See, Louisiana Board of Health, *Conference for Betterment of Health Conditions Among Negroes* (New Orleans 1914) 5.
- [13] C. V. Harris, *Political Power in Birmingham, 1871–1921* (Knoxville 1977) 179–80.
- [14] S. Galishoff, Germs know no color line: black health and public policy in Atlanta, 1900–1918, *Journal of the History of Medicine and Allied Sciences* **40** (1985) 22–41.

- [15] G. M. Fredrickson, *Black Liberation: A Comparative History of Black Ideologies in the United States and South Africa* (New York 1995) 95–105.
- [16] D. Delaney, *Race, Place and the Law, 1836–1948* (Austin 1998).
- [17] L. Pulido, S. Sidawi, and R. Vos, An archeology of environmental racism in Los Angeles, *Urban Geography* **17** (1996) 419–39. See also S. Sidawi, Planning environmental racism: the construction of the industrial suburban ideal in Los Angeles County in the early twentieth century, *Historical Geography* **25** (1997) 83–99.
- [18] R. D. Bullard, Solid waste sites and the Black Houston community, *Sociological Inquiry* **53** (1983) 273–88.
- [19] V. Been, Locally undesirable land uses in minority neighborhoods: disproportionate siting or market dynamics, *Yale Law Journal* **10** (1994) 1383–422.
- [20] A. Hurley, Fiasco at Wagner Electric: environmental justice and urban geography in St. Louis, *Environmental History* **2** (1997) 460–81.
- [21] H. W. Gilmore, The old New Orleans and the new: a case for ecology, *American Sociological Review* **9** (1944) 385–94; R. A. Fisher, Racial segregation in antebellum New Orleans, *American Historical Review* **74** (1969) 926–37; D. Spain, Race relations and residential segregation in New Orleans: two centuries of paradox, *Annals of the American Academy of Political and Social Science* **441** (1979) 82–96.
- [22] Fisher, *op. cit.*, and D. Somers, Black and white in New Orleans: a study of urban race relations, *Journal of Southern History* **40** (1974) 19–42.
- [23] R. A. Fisher, A pioneer protest: the New Orleans street-car controversy of 1867, *Journal of Negro History* **53** (1968) 219–33.
- [24] Z. L. Miller, Urban Blacks in the south, 1865–1920: the Richmond, Savannah, New Orleans, Louisville, and Birmingham experience, in L. F. Schnore (Ed.), *The New Urban History* (Princeton 1975).
- [25] A detailed topographic survey to provide base line information for the 1980s drainage plan showed the lowest area encircled by the ‘20 foot’ contour. Although this is below sea level and not 20 feet above sea level, this paper uses the designation of the engineers who surveyed the city’s topography.
- [26] New Orleans Board of Engineers, *Drainage Report* (New Orleans 1868) 4–5.
- [27] H. W. Gilmore, The old New Orleans and the new: a case for ecology, *American Sociological Review* **9** (1944) 385–94. Others have argued that poorly drained areas became the residential areas for blacks throughout the south, Kellog, *op. cit.*
- [28] New Orleans Board of Engineers, *Drainage Report* (New Orleans 1868) 5.
- [29] Louisiana Board of Health, *Annual Report, 1879* (New Orleans 1880).
- [30] *Ibid.*
- [31] New Orleans Auxiliary Sanitary Association, *Domestic Sanitation: The Evil, and the Remedy for the Privy System of New Orleans* (New Orleans 1879) 1–11.
- [32] J. J. Jackson, *New Orleans in the Guilded Age: Politics and Urban Progress 1880–1896* (Baton Rouge 1969) 147–8.
- [33] A. Kelman, A River and Its City: Critical Episodes in the Environmental History of New Orleans (Ph.D. Dissertation, Brown University, 1998) 244–5.
- [34] New Orleans Advisory Board on Drainage, *Report on the Drainage of the City of New Orleans* (New Orleans 1895) 5.
- [35] *Ibid.*, present drainage system map insert.
- [36] *Ibid.*, 18.
- [37] *Ibid.*, 24–8.
- [38] For a discussion of the development of New Orleans’ downtown area, see A. Mosher, B. Keim, and S. Franques, Downtown dynamics, *Geographical Review* **85** (1995) 497–517.
- [39] New Orleans Advisory Board on Drainage, *op. cit.*, 32.
- [40] George Earl (Superintendent of the Sewerage and Water Board), Drainage, sewerage, and water supply of New Orleans, Paper read at the 54th Annual Session of the American Medical Association, 1903, 7–8; in the Collection of the Tulane University Archives, Drainage folder, New Orleans, Louisiana.
- [41] Martin Behrman (Mayor of New Orleans), *New Orleans: A History of Three Great Utilities*, presented to the Convention of the League of American Municipalities, Milwaukee, Wisconsin, 1914, 6.
- [42] New Orleans Sewerage and Water Board, *Twenty-First Semi-Annual Report* (New Orleans 1910) 23.

- [43] New Orleans Sewerage and Water Board, *Twenty-Sixth Semi-Annual Report* (New Orleans 1912) 48–9. Although many other factors such as access to health care and diet undoubtedly contributed to higher mortality rates among Blacks.
- [44] Louisiana State Board of Health, *Biennial Report, 1906–1907* (Baton Rouge 1908). The rate of deaths per 100 000 due to malaria were 55 for Whites and 82 for Blacks. For typhoid the deaths per 100 000 were 7 for Whites and 31 for Blacks. Mortality rates by ward are unavailable, hampering any assessment of more localized impacts of the drainage system.
- [45] Louisiana State Board of Health, *Biennial Report, 1906–1907*, 119.
- [46] New Orleans Sewerage and Water Board, *Twenty-First Semi-Annual Report* (New Orleans 1910) 10.
- [47] *Woods Directory* (New Orleans 1912) n.p.
- [48] *Ibid.*
- [49] New Orleans wards covered sizable territories that were not yet cleared of cypress or drained, and therefore were uninhabitable. The ward maps presented here attempt to show the population within the built-up areas of the administrative units. Also, the wards were the smallest unit available for presenting population information, and it is not possible to map White and Black population concentrations within wards before census tract information was published in 1950.
- [50] Friday night storm was handled all right, *New Orleans Times Picayune* 12 May 1912, 6.
- [51] New Orleans Sewerage and Water Board, *Twenty-Sixth Semi-Annual Report* (New Orleans 1912) and New Orleans Sewerage and Water Board, *Thirty-Sixth Semi-Annual Report* (New Orleans 1917).
- [52] New Orleans Sewerage and Water Board, *Forty-Second Semi-Annual Report* (New Orleans 1920) 21.
- [53] Board of Health for the Parish of Orleans and the City of New Orleans, *Biennial Report, 1914–15* (New Orleans 1915) Table 1.
- [54] New Orleans Sewerage and Water Board, *Twenty-Third Semi-Annual Report* (New Orleans 1911) 23–5.
- [55] New Orleans Sewerage and Water Board, *Twenty-Sixth Semi-Annual Report* (New Orleans 1912) 75.
- [56] Behrman, *op. cit.*, 7 and New Orleans Sewerage and Water Board, *Forty-Second Annual Report* (New Orleans 1920) 21.
- [57] New Orleans Sewerage and Water Board, *Forty-Second Semi-Annual Report* (New Orleans 1920) 43.
- [58] Orleans Board of Health and Metropolitan Life Insurance Company, *Report of the Health and Sanitary Survey of the City of New Orleans* (New Orleans 1919) 46–9.
- [59] Sanborn Map Company, *New Orleans* (Pelham 1917–22).
- [60] New Orleans Sewerage and Water Board, *Fifty-Sixth Semi-Annual Report* (New Orleans 1927) 113.
- [61] South is deluged as city suffers heavy downpour, *New Orleans Times Picayune* 14 February 1927, 1; Heavy rain paralyzes traffic; bares drainage system's inadequacy, *New Orleans Times Picayune* 16 April 1927, 1; Water still deep in many sections long after rain, *New Orleans Times Picayune* 17 April 1927, 1.
- [62] New Orleans Sewerage and Water Board, *Sixty-Sixth Semi-Annual Report* (New Orleans 1932) map insert.
- [63] New Orleans Sewerage and Water Board, *Forty-Eighth Semi-Annual Report* (New Orleans 1923) 24.
- [64] Orleans Parish and City of New Orleans, *Biennial Report of the Board of Health* (New Orleans 1926).
- [65] Spain, *op. cit.*, 89.
- [66] Louisiana Act No. 117 (1912) authorized municipalities to enact segregation ordinances and Act No. 118 (1924) prohibited racial mixing by neighbourhood. New Orleans Ordinance 8037, Common Council Series (1924) implemented the state acts in the city. The major challenge to this act dealt with a rental property. *Louisiana Land Development Co. v. New Orleans*, Case File, City Attorney's Records, 1926, Box 1, New Orleans Public Library, City Archives, New Orleans, Louisiana.
- [67] *Land Development Company of Louisiana v. City of New Orleans* (13 F. 2d 898, 1926).
- [68] Delany, *op. cit.*, 151–3.
- [69] New Orleans Conveyance Office, COB340/FOL 446, 1921.

- [70] Petition to City Planning and Zoning Commission, 29 November 1923, by the law firm of Williams and Williams, New Orleans City Planning and Zoning Commission, Minute Book Vol. 7, October–December 1930, New Orleans Public Library, City Archives, New Orleans, Louisiana.
- [71] C. E. Vose, *Caucasians Only: The Supreme Court, The NAACP, and the Restrictive Covenant Cases* (Berkeley 1959) 6 and *Queensborough Land Company v. Cazeaux* (67 So. 641, 1917).
- [72] Forrest E. Laviolette, The Negro in New Orleans, in N. Glazer and D. McEntire (Eds), *Studies in Housing and Minority Groups* (Berkeley 1960).
- [73] The slight drop in percentage of population with sewers reflects residential growth in new areas slightly ahead of service extension.
- [74] New Orleans Sewerage and Water Board, *Fifty-Sixth Semi-Annual Report* (New Orleans 1927) 27–47.
- [75] New Orleans Sewerage and Water Board, *Sixty-Sixth Semi-Annual Report* (New Orleans 1932) 48.
- [76] Juliette Landphair, Sewerage, sidewalks, and schools: the New Orleans ninth ward and public school desegregation, *Louisiana History* 40 (1999) 35–62.