UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

REFUSE, REFORM, AND REVERSAL: AN ENVIRONMENTAL HISTORY OF THE CHICAGO RIVER, 1830-1910

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

JOHN MATTHEW CORPOLONGO
Norman, Oklahoma 2020

Downloaded from SHAREOK. Persistent Handle URL: https://hdl.handle.net/11244/324294

REFUSE, REFORM, AND REVERSAL: AN ENVIRONMENTAL HISTORY OF THE CHICAGO RIVER, 1830-1910

A DISSERTATION APPROVED FOR
THE DEPARTMENT OF HISTORY

BY THE COMMITTEE CONSISTING OF

Dr. Kathleen A. Brosnan, Chair

Dr. David M. Wrobel

Dr. Peter S. Soppelsa

Dr. Miriam D. Gross

Dr. Adam C. Malka

© Copyright by JOHN MATTHEW CORPOLONGO 2020
All Rights Reserved.

Table of Contents

Acknowledgements vii

Abstract ix

Introduction 1

Chapter I: Colonization, Ecology, and Engineering, 1830-1848 16

Chapter II: The Sanitation Challenge, 1848-1885 57

Chapter III: Diversion, Immigration, and Public Health, 1885-1889 98

Chapter IV: Construction and Social Control, 1890-1892 137

Chapter V: Planning an Exposition, Building Inequality, 1893-1910 175

Epilogue 215

Bibliography 221

Table of Figures

Figure 1: “The First Map of the Mississippi Based Upon the Works of Jolliet and Marquette,” Paris: 1683. 19

Figure 2: "Map Showing the Chicago Portage," Roger Deschner, Own Work. 21

Figure 3: John Melish, “Map of Illinois,” A Geographical Description of the United States (Philadelphia: John Melish, 1802), courtesy of David Rumsey Map Collection Cartography Associates. 26

Figure 4: Illinois and Michigan Canal Commissioners, “Chicago in 1835” (Springfield, IL: Illinois and Michigan Canal Commissioners, 1835), Courtesy of the Newberry Library. 40

Figure 5: Map Courtesy of Michael Conzen, (Conzen, 1988). 49

Figure 6: Elmira Advertiser, "Map of Chicago Showing the Burnt District" (New York: G.W. and C.B Colton and Co., 1871) David Rumsey Map Collection 74

Figure 7: The Sanitary District of Chicago, "Map of the Sanitary District of Chicago Showing Sewage Treatment Projects," (Chicago, City of Chicago Publishers, 1919). The solid line shows the North Shore Channel to Lake Michigan. This connected the North Branch of the Chicago River with the lake. Map courtesy of the Newberry Library, Chicago. 142

Figure 8: Sanitary and Ship Canal System: Before and After. Source: United States Army Corps of Engineers. http://www.usgs.gov/. 170

Figure 9: New Bridge Crossing the Canal Ditch, Looking East, 1899. Image Courtesy of F.E. Compton and Co. (1914), Chicago Historical Society. 172

Figure 10: Lift Cranes along the Canal Ditch, 1895. Image Courtesy of the Encyclopedia of Chicago. 173

Figure 11: Rivers of the Chicago Area. Image courtesy of the U.S. Fish and Wildlife Service, http://www.fws.gov/midwest/mussel/images/chicago_rivers.html. 184

Figure 12: South Fork of the South Branch of the Chicago River showing the connection with the Chicago River and the I&M Canal (1886). Map Courtesy of the Newberry Library. 211

Figure 13: Contemporary Satellite Image of the South Fork South Branch Chicago River. All of the original areas that provided the source of the I&M Canal have been completely filled. Image courtesy of Bubbly Creek Framework Plan. 212

Acknowledgements

I would first like to thank the primary archives that provided the source material necessary to produce this work. Most of my research occurred at the Harold Washington Library of the Chicago Public Library System in the Government Documents department. The courteous, friendly, and helpful staff there made the process quite enjoyable. The Chicago Historical Society at the Chicago History Museum also offered some valuable resources, including a few maps and information regarding the operations of the meat-packing industry in Chicago during the late nineteenth century. Many of the sources I encountered here helped me frame and contextualize my project. The Illinois State Archives provided many of the regional primary sources used in this project along with the Abraham Lincoln Presidential Library, which houses documents pertaining to rural media. Both Springfield archives proved essential to the completion of this dissertation.

I would also like to thank Illinois State Historical Society in Springfield, which supported my research through their King V. Hostick scholarship. The University of Oklahoma's Department of History also provided support through their Worth Robert Miller award and the Nancy L. Hodges and Wayne S. Morgan award. These scholarships allowed me to focus precious time and energy on the completion of this project, without which the process would have been immensely more difficult. Lastly, I would like to thank James Akerman and Patrick Morris, curators of the Department of Maps and Modern Manuscripts at the Newberry Library in Chicago for taking time out of their extremely busy schedules to sit down with me and introduce to the many beautiful maps and resources that the Newberry has to offer. Your generosity was truly an influence on me. I would like to extend a personal thanks to Michael Conzen for allowing me to use one of his own maps of the Illinois and Michigan Canal.

This project would not be possible without the guidance, support, firm criticism, and patience of my advisor, Kathleen Brosnan of the University of Oklahoma Department of History. Thank you for helping me find both my story and my argument. I would also like to thank my committee at the University of Oklahoma; Dean David Wrobel, Miriam Gross, and Adam Malka of the Department of History, and Peter Soppelsa of the History of Science Department. Your insight and continued presence throughout this process ensured that I never lost sight of the larger picture in my research. I must also extend a word of thanks to Katrina Lacher of the University of Central Oklahoma Department of History and Geography for sparking my interest in environmental history in the first place.

In closing, I would like to make a few personal acknowledgements, particularly to Kayla and Michael Molina, Courtney and John Buchkoski, Kevin Hooper, Abby Gibson, Katie and Spenser Shapiro, Derek and Stephanie Donwerth, Paige Ford, Meghan Dudley, Bethany Mowry-Ramos, and Jonathan Leckie. Your continued support has guided me immensely throughout my time at the University of Oklahoma. I cannot thank you all enough for being absolutely tremendous friends. Thank you. Finally, to my parents Melinda and John Corpolongo. You have taught me to keep working and to keep improving. The work is never done, and I owe so much to both of you for helping me start. This dissertation is dedicated to you.

J. Matthew Corpolongo
Norman, Oklahoma-May, 2020

Abstract

Throughout the nineteenth century, Chicago's industrial packinghouses, breweries, lumber mills, and brick foundries dumped their waste in the Chicago River. This sewage made the river an open sewer. The refuse threatened the city's primary source of potable water: Lake Michigan. Chicago's politicians, engineers, and sanitarians believed that the reversal of the Chicago River, made possible by the construction of the Chicago Sanitary and Ship Canal (SSC) in 1900, provided an adequate waste- removal system for the city. The SSC diverted the city's sewage away from the lake, sending it downstream toward the Illinois River. In 1906, however, the Chicago River remained an open sewer. It repulsed the socialist activist and author Upton Sinclair, who documented the city's horrid environs in his novel, *The Jungle*. Sinclair described the Chicago River as a "cesspool of filth" that "stank like the craters of Hell and defied a breath of fresh air to penetrate."[1] Although the project's architects publicly claimed that the reversal would clean the city's water, the diversion of the Chicago River served industry at the poor's expense. Those most susceptible to the river's pollution, particularly working-class immigrant and African American communities, remained underserved. The SSC gave industries the confidence to pollute as they always had near the most impoverished neighborhoods. Heralded as a reformist triumph, the project only reinforced technocratic bureaucrats not as regulators of polluters, but of peoples and nature. The reversal of the Chicago River, a regional commercial endeavor, defended Illinois's economic health in exchange for the public health of residents closest to industrial pollution.

[1] Upton Sinclair, *The Jungle* (New York: Doubleday, 1906), 328.

Introduction

In 2010, *The New York Times* examined a growing threat to the Illinois River Valley. Asian Carp had overwhelmed many tributaries of the Mississippi and Illinois Rivers, threatening Chicago, Lake Michigan, and the Great Lakes.[1] Environmental adaptation had brought the carp to the Illinois Valley and Chicago. Farmers in the southern United States introduced the resilient fish during the 1970s to help clean their commercial ponds. Originally from portions of India, Myanmar, and Thailand, the fish had no natural predators in North America. Officials tasked with dispelling the carp faced a difficult task. They also endured a deluge of criticism from commercial sailors, dockworkers, and shipping companies who all had dangerous encounters with the large fish. In 2009, Michigan Attorney General Mike Cox sought an injunction from the US Supreme Court. Cox worried about the fish infiltrating Lake Michigan through the Chicago Sanitary and Ship Canal (SSC), a waterway constructed in 1900 that reversed the flow of the Chicago River. The proposed injunction would order the Army Corps of Engineers ("The Corps"), the State of Illinois, and the city's sewer authority to close the canal.[2] Illinois Attorney General Lisa Madigan joined US Solicitor General Elena Kagan in opposing the injunction.[3] Madigan estimated that closing the SSC would cost 1.5 billion dollars in lost goods to the Great Lakes region. President Barack Obama opposed the SSC closure and after a year, the Supreme Court sided with the federal government, Illinois, and Chicago. Today, the SSC remains open.

The Asian Carp reflects Chicago's long struggle with a river that helped establish its economic dominance and that created its most prolonged crisis, a story about a false choice and reform. Diverting the Chicago River seemed logical and presented its supporters with a dilemma:

[1] Emma Graves, "Illinois Tries United Front Against Fish and Lawsuit," *The New York Times*, 13 January, 2010, A 21.
[2] Ibid., A22.
[3] Ibid.

sacrificing the public's health for commercial dominance or address sanitation at the expense of a sound economy. Few reversal supporters recognized that the choice was a fallacy, that a strong public health might help create a robust economy. Within the context of the national sanitation movement, the reversal's promoters, politicians, affluent rural Illinoisans, business leaders, and technocratic reformers, saw in the SSC a bulwark against the chaos of nature that improved sanitation and produced economic security.[4] A new commercial waterway would help expel the city's sewage, while improving riverine shipping. Chicago's major industries also escaped regulation as meatpacking plants, brick foundries, breweries, and lumber mills could dump their wastes as they always had. For those living near the highly polluted Chicago River, however, the reversal brought little change, the worst of both sanitation and economic stagnation. They did not have a choice. Socialist author and activist, Upton Sinclair, visited Chicago six years after the SSC's completion in 1906. What he saw on the city's South Side disgusted him. Sinclair described the river as a "cesspool of filth" that "stank and steamed contagion…bubbling and sizzling in the summer heat" from the coagulated animal wastes dumped there by industrial meatpacking plants.[5] Despite the engineered marvel represented by the SSC, many working-class residents still lived amidst the confining and suffocating stench of Chicago's prosperity.

[4] Numerous works document this movement. See: Joel A. Tarr, The Search for the Ultimate Sink: Urban Pollution in Historical Perspective (Akron, OH: University of Akron Press, 2006).; Martin Melosi, *The Sanitary City: Environmental Services in Urban America from Colonial Times to the Present* (Pittsburgh: University of Pittsburgh Press, 2008).; Martin Melosi, *Effluent America: Cities, Industry, Energy, and the Environment* (Pittsburgh: University of Pittsburgh Press, 2001).; Melanie A. Kiechle, *Smell Detectives: An Olfactory History of 19th-Century Urban America* (Seattle: University of Washington Press, 2017)., Harold L. Platt, *Shock Cities: Environmental Transformation in Manchester and Chicago* (Chicago: University of Chicago Press, 2005).; Suellen Hoy, *Chasing Dirt: The American Pursuit of Cleanliness* (New York: Oxford University Press, 1995).; Carl Zimring, *Clean and White: A History of Environmental Racism* (New York: New York University Press, 2006).; Catherine McNeur, *Taming Manhattan: Environmental Battles in the Antebellum City* (Cambridge, MA: Harvard University Press, 2017).; Carl Smith, *City Water, City Life: Water and Infrastructure of Ideas in Urbanizing Philadelphia, Boston, and Chicago* (Chicago: University of Chicago Press, 2014).; Daniel Schneider, *Hybrid Nature: Sewage Treatment and the Contradictions of the Industrial Ecosystem* (Cambridge, MA: The Massachusetts Institute of Technology Press, 2001).

[5] Upton Sinclair, *The Jungle* (New York: Doubleday Press, 1906), 327.

Others, including Jane Addams, saw in those closest to the polluted river, a striking need for a direct reform that provided for the public's health. Although both groups often claimed the "Progressive" mantle, Sinclair and Addams represented a stark departure from the technocratic reformer whose faith in engineered solutions and unbridled industry informed their actions.[6] As a regional commercial endeavor, the reversal of the Chicago River defended Illinois's economic health in exchange for the public health of residents most vulnerable to the river's pollution.

Table of Abbreviations **Subject**	Sanitary District of Chicago	Citizens' Association of Chicago	Chicago Sanitary and Ship Canal	Illinois and Michigan Canal	Calumet and Sangamon Canal
Abbreviation	SDC	CAC	SSC	I&M Canal	CSC

Despite the canal's incomplete success, its construction sparked a new era for Chicago and the United States during which civic leaders expanded the application of artificial waterways beyond travel and transportation. The SSC is significant for three reasons. First, in no other instance in the US did a city, state, or federal entity reverse a river's flow to forge an entirely

[6] For literature on the Progressive Era, see: Gail Bederman, *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917* (Chicago: University of Chicago Press, 1996)., Cohen, Adam. *Imbeciles: The Supreme Court, American Eugenics, and the Sterilization of Carrie Buck* New York; Penguin, 2016., John Milton Cooper, *Pivotal Decades: The United States, 1900-1920* (New York: W.W. Norton, 1990)., William Deverell, *Whitewashed Adobe: The Rise of Los Angeles and the Remaking of its Mexican Past* (Berkeley, CA: University of California Press, 2004)., Samuel Hays. *Conservation And The Gospel Of Efficiency: The Progressive Conservation Movement, 1890–1920* (1959)., Richard Hofstadter, *The Age of Reform* (New York: Vintage, 1960)., T. Jackson Lears, *No Place of Grace: Antimodernism and the Transformation of American Culture, 1880-1920* Chicago: University of Chicago Press, 1994., T. Jackson Lears, *Rebirth of a Nation: The Making of Modern America, 1877-1920* (New York: HarperCollins Publishers, 2009)., Michael McGerr, *A Fierce Discontent: The Rise and Fall of the Progressive Movement in America, 1870-1920* (New York: Oxford University Press, 2005)., Daniel T. Rodgers, *Atlantic Crossings: Social Politics in a Progressive Age* (New York: Belknap Harvard University Press, 2000)., Carl Smith, *City Water, City Life: Water and the Infrastructure of Ideas in Urbanizing Philadelphia, Boston, and Chicago* (Chicago: University of Chicago Press, 2013)., Ian Tyrell, *Crisis of a Wasteful Nation: Empire and Conservation in Theodore Roosevelt's America* (Chicago: University of Chicago Press, 2015)., David M. Wrobel, *Global West, American Frontier: Travel, Empire, and Exceptionalism from Manifest Destiny to the Great Depression* (Albuquerque, NM: University of New Mexico Press, 2013).

new sanitation system. Second, the timing of the canal project also constitutes an important difference between the Chicago River case and other locations. In *River Republic,* historian Daniel McCool outlines the historical use of American rivers to improve water quality, noting that the Environmental Protection Agency, established in 1970, targeted water pollution and aimed to improve river cleanliness by 1983.[7] With the threat to the city's primary potable water supply, Chicago leaders and state officials made water cleanliness a top priority more than seven decades before rivers garnered such systematic attention from the federal government.[8] Finally, while many of the projects outlined in McCool's work, including the rerouting of western rivers or the dredging of the Hudson River, were enormous civic undertakings, they did not occur on the same scale as the reversal.

Regional geography helped make Chicago an attractive transportation hub and proved crucial for the reversal project. Indigenous peoples had used the Chicago River and the nearby Chicago Portage to traverse the swampy terrain between Lake Michigan and the Des Plaines River, west of the Chicago settlement. In 1848, the Illinois and Michigan Canal Commissioners, a state agency, administrated the constructions of the Illinois and Michigan Canal (I&M Canal) to connect the Chicago River with the Des Plaines in a singular waterway. The I&M Canal made travel to Chicago from the south easier. This waterway complemented the already steady flow of traffic traveling from the east on the Great Lakes. Both access points contributed to a rapid population increase. As the I&M Canal helped strengthen connections between the city and its rural partners, Chicago soon consolidated markets. With its linkages to the Eastern Seaboard,

[7] Daniel McCool, *River Republic: The Fall and Rise of America's Rivers* (New York: Columbia University Press, 1983), 190-191.
[8] Ibid., 192.

Chicago could ship goods less expensively. Farmers and merchants could earn more money for their products and industry emerged from this expanded commercialization.

Throughout the nineteenth century, Chicago's industrial packinghouses, breweries, lumber mills, and brick foundries dumped their waste in the Chicago River. The city's population also rose dramatically, beginning as a small village of 100 people in 1833 to a city of 1,000,000 by 1900. Mixing with human and animal urine and feces, this refuse made the river an open sewer. The refuse threatened the city's primary source of potable water: Lake Michigan. Chicago's elected leaders and technological elites believed that the reversal of the Chicago River, made possible by the construction of the SSC in 1900, provided an adequate waste-removal system for the city. The SSC diverted the city's sewage away from the lake, sending it downstream toward the Illinois River.

The unanticipated consequences of the reversal of the Chicago River, including the Asian Carp invasion, reflect the complexity of the reversal project as an achievement of environmental change and sanitary infrastructure. The SSC is a built environment. People worked on the canal, securing their livelihoods and engaging with national commerce. The canal also managed resident's living spaces and represented an innovation that improved Chicago's sanitation infrastructure. Reversing the Chicago River also created a new river-system that centralized an engineered waterway that residents interacted with as they would any other river. Connecting Chicago with rural Illinois meant that the SSC constituted a commercial highway, a sanitary infrastructure, and a canal.

Urban environmental historians have devoted substantial research to the study of cities and urban spaces as environments adapted yet designed by people. Built environments are spaces constructed by humans. They are, however, not only living spaces. Roads, bridges, transit

systems, parks, and recreational areas all represent built environments. The SSC is another important example. Joel A. Tarr and Martin V. Melosi are two pivotal scholars of the built environment. In *The Search for the Ultimate Sink* and *The Sanitary City*, respectively, both scholars contend that sanitation is an important concept in the construction of successful cities.[9] Tarr argues that urban planners and sanitarians both sought temporary, quick sanitary solutions. Those solutions, or "sinks" offered immediate responses to sanitary challenges, but often produced further problems. Melosi alternatively views them as the "circulatory system" of a city. Like organisms, a city must process material introduced to its infrastructure. Successfully expelling the wastes introduced in this process often separated the viable city from those that failed.

Tarr and Melosi agree that the city is an environment and merits study from environmental historians. Neither consider the SSC, however, and how the reversal of the Chicago River represents the arguments they make. The SSC is a built environment constituted within the larger urban infrastructure of Chicago. Both a constructed space and a sanitation system, the SSC reveals an important representation of urban-environmental complexity. Urban-environmental historians frequently separate built environs from sanitation systems. Melosi discusses both sanitation systems as an important component of urban development. This makes sense; people usually do not inhabit sewers. The SSC, however, offers an opportunity to consider a built environment constructed not for human life or recreation, but to sustain human institutions. It is, nonetheless, a built environment.

---

[9] Tarr, *The Search for the Ultimate Sink*, xxix.; Melosi, *The Sanitary City*. Winner of the George Perkins Marsh Prize from the American Society for Environmental History, the Urban History Association Prize for the best book in North American Urban History, the Abel Wolman Prize from the Public Works Historical Society, and the Sidney Edelstein Prize from the Society for the History of Technology. For an even more comprehensive analysis of United States urban sanitation history, consult the original work; Martin V. Melosi, *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present (Creating the North American Landscape)* (Baltimore: Johns Hopkins University Press, 1999).

Urban-environmental historians should expand how they study and define the built environment. Simultaneously adaptations and alterations of the ecological environment, built spaces represent an important avenue for the expansion of urban-environmental history. As displayed in the case of the Asian Carp, the SSC also changed the Chicago River's ecology. By connecting seemingly disparate ecotones, the reversal blurred the boundary between "natural" and "artificial," both terms that remain inadequate for this study. Viewed historically, the reversal represented to its engineers a control of nature. Over time, that assumption proved both arrogant and incorrect.

The reversal of the Chicago River represents the contested rise of technocracy. A robust scholarship of technocracy and technocratic reform exists. Although this project intervenes in urban-environmental history, it is necessary to consider how technocracy is employed in this narrative. Definitionally, technocracy is the application of technological knowledge in society, whether through political, economic, private, or public service institutions.[10] Technocrats are experts who employ their specialized training with technology to reform society. In the case of the Chicago River reversal, technocrats used their expertise to control an unpredictable and polluted ecology, while justifying their right and ability to do so. Considering the role of

[10] Timothy Mitchell, *The Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley, CA: University of California Press, 2015), 14-15. For scholarly analyses of the state, technology, and expertise see: James C. Scott, *Seeing Like a State: How Certain Schemes to improve the Human Condition Have Failed* (New Haven, CT: Yale University Press,)., David A. Biggs, *Quagmire: Nation-Building and Nature in the Mekong Delta* (Seattle, University of Washington Press, 2012)., Ken DeBevoise, *Agents of Apocalypse: Epidemic Disease in the Colonial Philippines* (Princeton, NJ: Princeton University Press, 1995).; Sigrid Schmalzer, *Red Revolution, Green Revolution: Scientific Farming in Socialist China* (Chicago: University of Chicago Press, 2016).; Brett L. Walker, *Toxic Archipelago: A History of Industrial Disease in Japan* (Seattle, WA: University of Washington Press, 2010).; Bryan Tilt, *Dams and Development in China: The Moral Economy of Water and Power* (New York: Columbia University Press, 2015).; Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhone* (Cambridge, MA: Harvard University Press, 2011).; Mark Cioc, *The Rhine: An Eco-biography, 1815-2000* (Seattle: University of Washington Press, 2006).; Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Oxford University Press, 2002).; Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1996).; David A. Pietz, *The Yellow River: The Problem of Water in Modern China* (Cambridge, MA: Harvard University Press, 2015).

technocratic experts in altering the Chicago River is important in understanding its broader history as both an ecological and engineered waterway.

The reinforcement of technocracy as represented by the reversal of the Chicago River reflects the social ramifications of a dramatic case of environmental interaction. Human engagement with both natural and built surroundings involves a confrontation with how people also interact with and view one another. Urban-environmental historians have embraced this perspective in their scholarship over the last twenty-five years. The cultural shift in urban-environmental history is visible in recent works by Harold Platt, Daniel Schneider, and Carl Smith. In *Shock Cities*, Platt builds on the influential work of Tarr and Melosi, but emphasizes urban social justice and late-nineteenth century sanitation efforts in Manchester, England and Chicago.[11] As "shock cities," these urban centers expanded rapidly, often developing severe sanitation problems that coincided with massive economic disparity. Sanitation engineers in these places attempted to respond to the "horrors and wonders of contemporary society" by reconciling the contradiction between impressive technological advances and the backwardness of pollution, poverty, and oppression.[12] Capitalist industry, as Platt argues, produced paradoxical economic and environmental conditions where severe ecological degradation and poverty existed alongside tremendous wealth.

Daniel Schneider also identified contradictory nineteenth-century ideologies in his work, *Hybrid Nature*.[13] Schneider examines sewage treatment plants as ecosystems, which employed bacteria as productive engines within the structure of the industrial ecosystem. The

[11] Platt, *Shock Cities*. For further analysis of Atlantic cultural, political, and technological changes see also: Daniel Rodgers, *Atlantic Crossings.* Rodgers' work assesses the intellectual, scientific, and technological influences of European countries on Progressive Era reforms in the United States that includes the infrastructural development of major cities including New York City and Chicago.
[12] Ibid., xiv.
[13] Schneider, *Hybrid Nature*.

biotechnological industry is the primary site through which Schneider makes this analysis.[14] By identifying the contradictions between nature and technology, public sanitation efforts versus private methods, the professional engineer and the worker (including bacteria) and purification and profit, Schneider reveals the struggle of urban elites to address industrial pollution while maintaining commercial viability.[15] He concludes by examining the privatization of public sanitation and even the patenting of living organisms; both are, Schneider claims, contradictions to the goal of waste disposal and purification. Chicago's sanitarians attempted to accomplish both with the reversal. Schneider balances enviro-technological and intellectual history to examine both pollution and sanitation as cultural constructs.

Although technology garnered significant attention in early urban-environmental history, recent scholarly study followed the shift established by Platt and Schneider. Carl Smith, in *City Water, City Life*, synthesizes nineteenth-century sanitation, cultural, and intellectual history. Illustrating how water-usage influenced the development of public services, Smith argues that a city is as much an "infrastructure of ideas" as it is a collection of people.[16] Smith maintains that ideology often accompanied industrialization.[17] This infrastructure of ideas is the cultural and ideological development philosophy that represented a shared ethos among urban planners and elected leaders. To present this concept, Smith analyzes the construction of water services in Philadelphia, Boston, and Chicago, while studying Progressive Era politics. Within these ideals, many features of the modern city, chiefly parks, offered an escape from urban life to a culturally sanctioned and manicured nature. Although urban infrastructure remains central to Smith's analysis, his perspective is primarily ideological and only considers affluent residents. Smith's

[14] Ibid., 206.
[15] Ibid., xx.
[16] Smith, *City Water, City Life*.
[17] Ibid., 2.

scholarship in *City Water, City Life* marks the completion of a cultural turn in urban-environmental history.

Urban-environmental historians should study engineered adaptations as examples of a continuing engagement with surrounding ecologies. Sanitary systems represent built environments and erode the boundary between natural and artificial. In the SSC's case, this perspective acknowledges the reversal of the Chicago River as a transportation-sanitation system that create a new riverine ecology. Residents interacted with the waterway much as they would any other river, along with the perils of a riparian system from pollution and flooding to invasive species. Scholars of the built environment would do well to transcend the dichotomy between natural and artificial. Expanding the definition of a built environment would also bridge the study of urban and rural spaces. Engineered waterways offer a viable avenue for that analysis.

The reversal of the Chicago River remains understudied by urban-environmental historians. Some of the earliest scholarship of Chicago's environment includes the work of historical-geographer Michael Conzen and historian William Cronon. The I&M Canal is an important component of their work, but no scholar has devoted a monograph-length study to the river reversal. Conzen has led the study of the I&M Canal's role in Chicago's early growth, arguing that the waterway laid the foundation for Chicago in the latter half of the nineteenth century.[18] Through his thorough study, Conzen offers the audience an inexhaustible array of information, resources, and historical context essential for a synthesis of Chicago's environment. In *Nature's Metropolis*, Cronon argues that Chicago's interactions with its hinterlands sustained

[18] Kay J. Carr and Michael Conzen, *The Illinois and Michigan Canal National Heritage Corridor* (De Kalb, IL: University of Northern Illinois Press, 1988). Conzen also wrote an introduction to the re-issuing of the WPA Guide to Illinois in 1983 with Neil Harris. This work, though an excellent primary source for information regarding Chicago and the state of Illinois more broadly in 1930, there is little information regarding the Sanitary and Shipping Canal nor is there an analysis of the waterway's role in the current development of present-day Chicago. Federal Writers' Project of the Works Projects Administration, Michael Conzen and Neil Harris, Introduction, *The WPA Guide to Illinois: The Federal Writers' Project Guide to 1930s Illinois* (New York: Pantheon Books, 1983).

both the city and its periphery.[19] For Cronon, Chicago represented its own environment and developed from the surrounding ecological conditions. Railroads helped established the lumber, meatpacking, and grain industries that fueled Chicago's economy throughout the late nineteenth and twentieth century, linking the city center, like a hub and spoke, with rural areas that sustained its growing population. A study of the city's outward relations, however, *Nature's Metropolis* pays little attention to some of Chicago's natural features, such as the river and Lake Michigan. This dissertation centers the ecological features important to Chicago's historical development and reverses Cronon's perspective by analyzing not only how natural resources traveled to the city, but also how they left. Industrial production harnessed these materials and expelled them in the form of wastes that prompted another unintended exchange between Chicago and its urban partners.

Libby Hill remains the only scholar to produce a monograph examining the Chicago River's environmental history. In *The Chicago River*, Hill illustrates how Chicago's ascension to international prominence at the beginning of the twentieth century intersected with the Chicago River and associated Portage.[20] Hill contends that city and river formed a symbiotic bond that resulted in changes for both Chicago's built environment and the natural features that afforded its economic success.[21] The SSC, in turn, forged relationships with other rivers and spaces outside of Chicago's urban sprawl, which broadened its environmental implications to include many

[19] William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton and Co., 1991).
[20] Libby Hill, *The Chicago River: A Natural and Unnatural History* (Chicago: Lake Claremont Press, 2000), 6.; Footnote 13, 7-8. Hill's work also examines the long-term implications for the Chicago River during the twentieth century and provides a close analysis of the ecological and geological changes that resulted from the Sanitary Canal project. The book's geographic scope remains exclusively within the Chicagoland area and addresses many of the local responses to recent policies regarding the Sanitary Canal and other issues pertinent to Chicago in conjunction with the Chicago River.

other communities and waterways. It also represented much more than a source for financial viability; it became a method for creating a more secure society through the supposed improvement of a natural riverine system. Thus, the SSC became more than a new sanitation strategy for the polluted metropolis; it altered how rivers near the city interacted with one another.

Combining the cultural turn in urban-environmental history with the study of an important ecological feature, this dissertation examines Chicago's economic, social, and environmental past. Numerous archives, libraries, private collections, and government documents provided this project's evidence. The Municipal Records collections at the Harold Washington public library center in Chicago, supported this project's primary research repository for local records. Sources gathered include the minutes of the SDC's regular meetings. The Illinois State Archives houses the Illinois Governors' papers, engineering reports, minutes of engineering associations, including the Council of the Mississippi River Valley, and citizen activist papers that comprise the dissertation's regional perspective. Personal letters, correspondence, and newspapers from Chicago's working-class neighborhoods and rural, Illinois communities provided a substantial portion of this dissertation's regional voice. The Chicago City Council minutes, archived at Northeastern Illinois University (NEIU) in Chicago, provided the political and municipal perspectives on the river reversal project.

This dissertation contains five chapters. The first three detail Chicago's initial confrontations with sanitation problems, diseases, and preliminary drainage plans. The final two chapters discuss the SSC's construction and regional responses to the project. Although each chapter proceeds chronologically, there are thematic frameworks that straddle multiple chapters.

Chapter One illustrates Chicago's founding and the regional ecology that made the area an attractive transportation hub. This chapter contends that the river and the canal that followed, capable of securing prosperity and producing a public health catastrophe, remained the region's greatest asset and most complex problem. This chapter discusses the Blackhawk War and the Anglo-American invasion and colonization of indigenous lands. Once US military forces seized northern Illinois, permanent settlements emerged. In 1830, the US military recommended a link between Lake Michigan with the Mississippi. The I&M Canal, completed in 1848, resulted from these suggestions and provided easier transportation to Chicago. Settlers, lumbermen, and merchants, however, all dumped their waste into the new canal, creating a massive sanitation problem and the spread of water-borne illnesses.

Chapter Two analyzes the first attempts to improve Chicago's sanitation and the city's failure to contend with water as a complex, multi-use resource. This chapter argues that rather than regulate waste-dumping, conversations about sanitary improvement largely revolved around compounding Chicago's strained water distribution and sewage systems with diversion. Ellis Chesbrough, architect of Boston's first sewer system, designed a similar infrastructure in Chicago. The new iron pipelines required raising the city ten feet and provided mostly wealthy neighborhoods with improved drinking water. Sewage dumped into the Chicago River, however, generated significant concern among affluent residents, pressuring political and public health leaders to institute dramatic changes. The Great Fire of 1871 and the Flood of 1885 revealed threats posed by heavily polluted water and an ineffective sanitation infrastructure.

Chapter Three examines the diversion concept along with both its supporters and opponents. This chapter argues that the Citizens' Association of Chicago, a supporter of the reversal, promoted a completely new sanitation infrastructure to accommodate rather than

constrain the dumping habits of the city's most profitable industries. Known historically as "diversion," the reversal invited intense skepticism and scrutiny. Central Illinois communities leveraged their sanitary concerns to ensure economic benefits rather than directly oppose diversion. This made the diversion plan a regionally negotiated project. Coverage in this chapter includes research performed by state physicians and their belief that immigrants helped cause Chicago's sanitation crises. The Illinois General Assembly established the SDC in 1889 to address Chicago's highly contaminated urban environment with state support. Although concerns remained about sewage flowing downstream, the promise of toll revenues and river-front development secured rural support for diversion.

Chapter Four illustrates the early stages of construction. It argues that Chicago gained a new transportation and sanitary system that secured a predictable trajectory of economic growth defended and managed by the city's public sanitation bureaucracy. Chicago's political and economic leadership, including City Council members and SDC engineers, viewed their plans as economic boosterism. The SDC's first Chief Engineer, Lyman Edgar Cooley, used the reversal as a moment to harness the complete power of the agency and revolutionize Chicago's technocracy. For Cooley, such a technocratic sanitary bureaucracy provided a means to reform and conform Chicago's unruly population and environment. It was also an opportunity to establish the credentials of engineers, physicians, and scientists. As the SDC planned the reversal, they simultaneously prepared to reverse the social and sanitary challenges they viewed as a threat to their societal status.

Chapter Five concludes the SSC's construction. The chapter contends that the reversal of the Chicago River represented a reform of technocratic power enshrined in massive sanitary agencies rather than direct improvement for vulnerable residents. Despite its completion, the

SSC did not adequately address the sanitation conditions for the city's most vulnerable residents. Robert Gage, the chairman of the World's Columbian Exposition Planning Committee, however, convinced municipal leaders to hasten the canal's completion to maintain a clean aesthetic for fairgoers. Between 1893 and 1900, Chicago garnered national praise for its new "drainage channel." Despite the achievement, living conditions, particularly in African American neighborhoods, worsened. Chicago's industrialists gained a newfound confidence to dump their wastes as they always had, while gaining access to inexpensive shipping. Social reform was marketable and served only to perpetuate the ideology of paternalist sanitarians and engineers. Thus, the city's working-class and immigrant communities remained underserved. Reformers emerged who advocated direct assistance to the city's residents including Jane Addams, Alice Hamilton, and Upton Sinclair. They viewed the new canal and Chicago's sanitary efforts as inadequate.

The conclusion details the broader implications of the reversal, socially, economically, and environmentally. The reversal had achieved its stated objective: improved water quality, efficient transportation, and control of the city's riverine environment. The SSC, however, also represented a monument to economic prosperity through environmental predictability; a mastery over landscape and peoples deemed "filthy."

Chapter I: Colonization, Ecology, and Engineering, 1830-1848

Chicago's history begins with water. The glacial Great Lakes receded following the Second Ice Age leaving behind a collection of streams, rivers, and small lakes. The aquatic chain linked the prairies of western and southern Illinois to the swamps surrounding Lake Michigan. In wet spring and summer months, the area flooded, forming a series of portages that connected the lake to the Illinois River and therefore to the Mississippi River.[22] These portages coalesced peoples, both in cooperation and in violence. Indigenous nations, having established commercial interactions with one another and with European fur-traders, clashed first amongst one another for cultural, political, and economic reasons.[23] Historian Ann Durkin Keating documented the region's early years in her book *Rising Up from Indian Country*. Keating notes that engagements between Indigenous peoples and European fur-trade colonials proceeded in a complex manner, driven by intermarriage, trade-agreements, and spoken negotiations regarding territory.[24] Open conflict emerged between alliances of Native communities and Europeans in the seventeenth century and later with British and Anglo-American imperial forces.[25]

At the center of these complex relations, the Chicago River was an environmental paradox, necessary to support prolonged settlement and a threat to public health. The area's streams and portages suggested a prime location for a permanent city, but the waters also long mingled indigenous nations, French traders, and Anglo settlers amidst violence, cholera and death. US military leaders who arrived in the 1780s, along with merchants and other white

---

[22] Wayne Grady, *The Great Lakes: The Natural History of a Changing Region* (New York: Greystone Books, 2007), 13-14.; David Solzman, "Chicago Portages," *The Encyclopedia of Chicago* (Chicago: Chicago Historical Society, 2004).
[23] Ann Durkin Keating, *Rising Up From Indian Country: The Battle of Fort Deaborn and the Birth of Chicago* (Chicago: University of Chicago Press, 2012), 5. See also: Anne F. Hyde, *Empires, Nations, Families: A New History of the North American West, 1800-1860* (New York: Ecco, 2012).
[24] Ibid., 19.
[25] Richard White, *The Middle Ground*: *Indians, Empires, and Republics in the Great Lakes Region, 1650-1815* (Cambridge: Cambridge University Press, 1991), 49.; *Keating, Rising Up from Indian Country*, 100.

Americans, flooded the region in the early-nineteenth century. Many anticipated the strategic and commercial possibilities at the junction of the Chicago River and Lake Michigan. For a metropolis to emerge, two problems required attention: the need for a continuous route between the lake and the Mississippi uninterrupted by seasonal variations; and the need for efficient waste disposal given the location's low elevation and swampy terrain. Misunderstandings of its complex ecology would complicate these goals, but the Chicago River was central to the urban enterprise. Chicagoans and the area's rural residents ultimately joined the waterways with their financial futures. Capable of securing prosperity and producing a public health catastrophe, the river and the canals that followed, remained the region's greatest asset and most complex problem.

The Blackhawk War, Cholera, and Chicago's

Transportation was crucial for colonization. Louis Jolliet, a French explorer and fur-trader, first recommended in 1674 that the riverine system joining Lake Michigan with the Mississippi could be channeled into a canal. Native American preeminence and a lack of colonial desire failed to realize his vision. With its riparian system and other resources, the territory was a volatile theater of conflict for more than a century. Nonetheless, the idea of a superseding artificial waterway persisted.

The Chicago region developed from receding glaciers over the thousand years since the Ice Age. Joel Greenburg, in his work *A Natural History of the Chicago Region*, illustrates the ecological formation of the area between the Illinois River and Lake Michigan. As glaciers shrunk, a massive body of fresh water remained known by scholars as Lake Chicago.[26] As the massive lake shrank, changing elevation and drainage created Lake Michigan in its current form.

[26] Joel Greenburg, *A Natural History of the Chicago Region* (Chicago: University of Chicago Press, 2002), 8.

Receding waters also generated the Chicago Lake Plain. This land was extremely flat, "leveled by waves and the still-water deposition of clays."[27] There was also relief in the area, represented by the Continental Divide west of Lake Michigan and Blue Island to the south. Palos Heights existed further to the south and west. Surrounding these points of elevation was flat, swampy terrain. The rivers of the Chicago Lake Plain, therefore, drained into Lake Michigan, the Chicago River among them. The west side provided Mississippi River drainage. Many of these rivers were nothing more than "marshy swales that dried up in the summer."[28] The Chicago River flowed eastward across the Plain toward Lake Michigan, while the Des Plaines River flowed south from Wisconsin on the western edge of the divide toward the Illinois River. In the eastern-most section of the Chicago Lake Plain is a large slough known as Mud Lake which served as a conduit allowing heavy flows of the Des Plains to discharged into the south fork of the Chicago River. During rainy seasons, travelers could sail up the Des Plaines River on the west side of the Divide and onto the Chicago River where they could access Lake Michigan. This constituted the Chicago Portage.

The Portage linked the Illinois and Des Plaines rivers with the Chicago River and Lake Michigan.[29] As the historical geographer Michael Conzen observes, the Illinois Valley, which connected the Chicago Portage with southern Illinois, offered a "natural highway together with a virtually continuous string of deposits including gravels, sands, and clays" that made useful construction material. The region's natural transportation network made the prospect of permanent settlement economically viable.[30] Over time, the Chicago Portage represented a

[27] Ibid., 9.
[28] Ibid., 178.
[29] Grady, *The Great Lakes*, 51.; Greenberg, *A Natural History of the Chicago Region*, 180.; Solzman, "Chicago Portages," *The Encyclopedia of Chicago*.
[30] Kay J. Carr and Michael Conzen, *The Illinois and Michigan Canal National Heritage Corridor: A Guide to its History and Sources* (DeKalb, IL: University of Northern Illinois Press, 1988), 4.

"significant channel of movement."[31] Below is an historical rendering of the Mississippi River Valley and Lake Michigan, produced by the French explorers Louis Jolliet and Jacques Marquette. The map almost illustrates a straight line from the Gulf of Mexico to Lake Michigan, denoting the obvious transportation potential the men saw in the Chicago region. This map even charts a connection between Lake Michigan and the Illinois River as a singular waterway, rather than a collection of portages and streams. Displayed as a unified link, the French depiction of the Chicago Portage reveals its importance to their engagement in the region and their belief in its potential as a transportation highway. The map also displays the locations of Native communities or settlements.

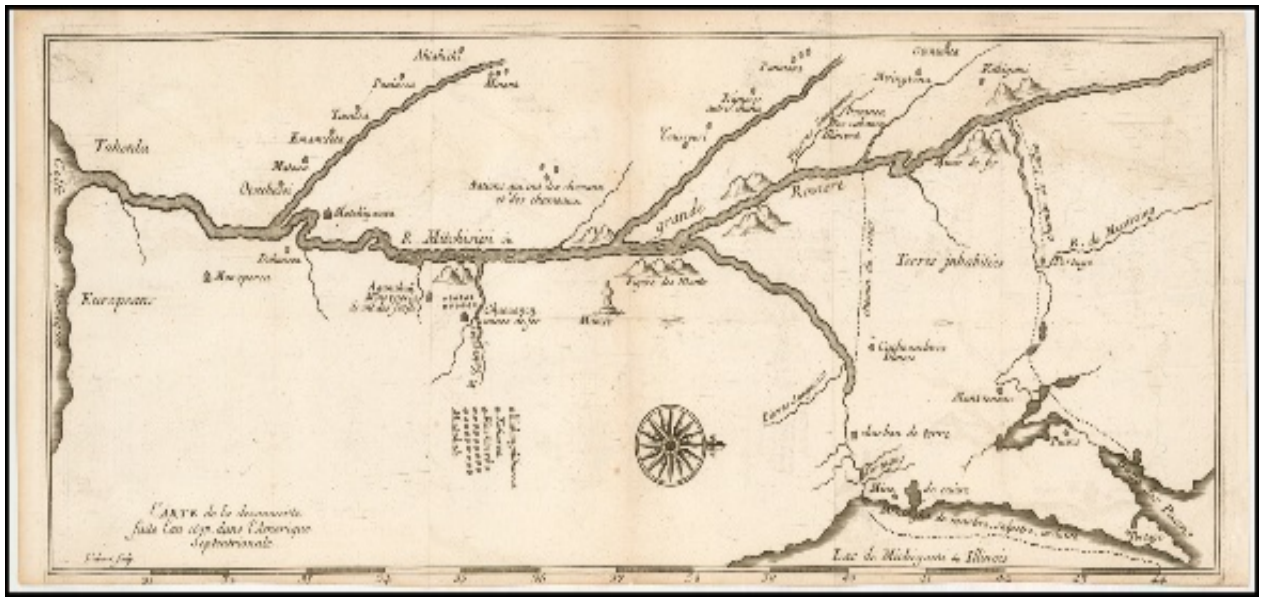


Figure 1: "The First Map of the Mississippi Based Upon the Works of Jolliet and Marquette," Paris: 1683.

Jolliet and Marquette helped chart the landscape for what would be numerous future expeditions to the Chicago region. Jean Baptiste Point DuSable, an explorer and surveyor of

[31] Ibid., 6.

African descent born to freed French fur-traders, also saw the economic potential of the area's ecology. He traversed much of the riverine system and the Great Lakes region during the 1770s and recognized their value in supporting new settlements.[32] By 1795, DuSable permanently resided near the mouth of the small Chicago River at Lake Michigan.[33] Some 89 years later, Chicago's booster historian, A.T. Andreas, proclaimed DuSable the city's first resident, a claim that ignored the long residency of indigenous peoples in the region.[34] Their presence was not lost on DuSable; he began trading with them in the 1770s. Arent Schuyler De Peyster, a British officer who recruited Native Americans from the Great Lakes during the American War of Independence, viewed DuSable's communications with the Ottawa, Pottawatomi, and Miami nations as crucial information for British military operations.[35] DuSable attempted to forge peaceful commercial relationships with the indigenous nations. He hoped to create such cooperation by marrying a Pottawatomi woman. Riverine travel, however, had facilitated larger migrations, complicating interactions between the region's residents. Water sustained life and commerce, but also sparked armed conflict.

Prior to DuSable's arrival, the Chicago River, portages, and small lakes linked Amerindian settlements with western sub-humid environments and the eastern seaboard. The location and its ecological features supported many different indigenous peoples and brought

[32] Keating, *Rising Up from Indian Country*, 20-25.; See also: Arent Schuyler De Peyster, *Miscellanies* (Dumfries and Galloway Office, 1813). With respect to DuSable, also see Dominic Pacyga, *Chicago: A Biography* (Chicago: University of Chicago Press, 2009).
[33] A.T. Andreas, *History of Chicago: From the Earliest Times to the Present* (Chicago: A.T. Andreas, Publisher, 1884). See also: *Official World's Fair Weekly*, "Chicago's First Citizen (New York: 1933). DuSable often garnered attention in promotional literature, giving Chicago a longer history to compete with older eastern cities. The Century of Progress Exposition of 1933 made him a personification of the city's history, with a replica of his home. See: Cheryl Ganz, *The 1933 Chicago World's Fair: A Century of Progress* (Urbana, IL: University of Illinois Press, 2012), 119.
[34] Keating, *Rising Up from Indian Country*, 50.
[35] Arent Schuyler De Peyster, "Letter to Joseph Brant, 8 May, 1782," in *Miscellanies by an Officer,* (New York: C.H. Ludwig, 1888), x.

them into contact with European traders and colonizers. With the arrival of Europeans in the eighteenth century, the importance of this natural transportation highway intensified.[36]

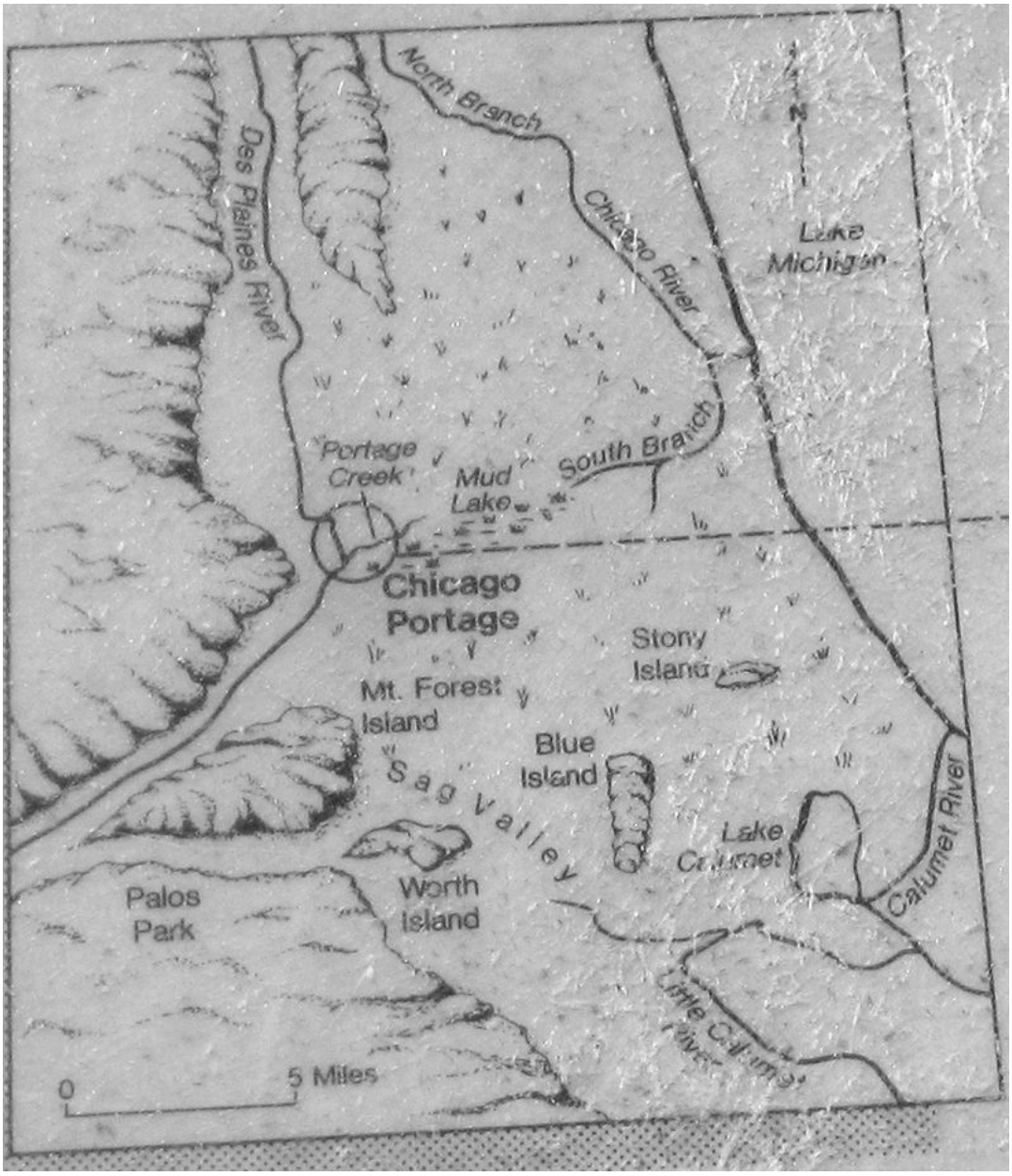


Figure 2: "Map Showing the Chicago Portage," Roger Deschner, Own Work.

Eventually, British fur traders convinced one of the more powerful indigenous confederacies, the Pottawatomi, to shift many trade agreements from the French to Anglo

[36] Carr and Conzen, *The Illinois and Michigan Canal National Heritage Corridor*, 5.

colonials. As French influence waned, particularly after the Seven Years' War, Britain established a presence in the region during the late eighteenth century.[37] Negotiating with the Pottawatomi, Britain gained access to the Illinois and Chicago Rivers. Pottawatomi women, according to Keating, possessed tremendous influence during the negotiations. Marriage was essential to establishing Pottawatomi-Anglo alliances. Native women could secure or sever cooperation with Anglo fur-traders through marriage. These negotiations, often complex interactions of inconsistent understanding, formed what historian Richard White calls the "middle ground."[38] White contends that in the Great Lakes region, known as the *pays d'en haut* to French traders, Indigenous and European peoples established systems of interaction that were social, cultural, and economic in nature. Eventually those interactions dissolved into confrontations between indigenous peoples and European settler-colonials. This clash resulted in wide-spread colonization of the Great Lakes region by Anglo-Americans.

With the passage of the Treaty of Greenville in 1795, which yielded the Illinois River basin to the United States, Anglo-American settlers set to work organizing the Chicago Portage.[39] Native peoples, however, did not cede territory so easily, particularly since marriages had joined Anglo-Americans with them politically and economically. John Kinzie, one such fur-trader and married to a Pottawatomi woman, helped coordinate alliances between American fur-trade companies and local Native confederations.[40] Originally from Quebec, Kinzie arrived with a US military contingent and observed the creation of an American stronghold. The construction of Fort Dearborn in 1803 solidified the military struggle between the US and Indigenous nations including the Sauk, Fox, Illinois, and Pottawatomi. For many American political and economic

[37] Keating, *Rising Up from Indian Country*, 60-80.
[38] White, *The Middle Ground,* xxv-iii.
[39] Carr and Conzen, *The Illinois and Michigan Canal National Heritage Corridor*, 7.
[40] Keating, *Rising Up from Indian Country*, 90.

leaders, "internal improvements" represented an urgent need to maintain both commerce and defense.[41] Native peoples also bolstered their preparations for confrontation with white settlers.

DuSable had left the Chicago River in 1800 and sold his plot of land to Kinzie.[42] Once the US had established its somewhat tenuous authority in the Great Lakes region, white settlements and urban landscapes emerged. Chicago, a derivation of the Miami word *chicagoua*, meaning "wild leek**,**" was a minor fishing village in 1800. [43] The location attracted investors and supported further real estate development.[44] Fort Dearborn, located about two miles south of DuSable's home on the Chicago River, offered protection for white settlers moving to the region. This military presence, however, also provoked violence with Native Americans. The Treaty of Greenville had supposedly ended hostilities between the fledgling US and the indigenous nations of the Northwest Territory. The Pottawatomi, specifically, believed that the treaty reaffirmed their sovereignty. Many Native nations, the Pottawatomi among them, also viewed their marital alliances as a sound protection of that sovereignty.[45] US expansion, however, required westward movement and white encroachment continued. In the Great Lakes region, this expansion generated further conflict between Anglo settlers attempting to seize Native-held land. Many nations shared the Pottawatomi concerns, including the Sauk, a confederation roughly located to the north and west of Fort Dearborn. The same waterways that DuSable used, including the

[41] Carr and Conzen, *The Illinois and Michigan Canal National Heritage Corridor*, 8. For further information on the infrastructural development of Early America, see: George Rogers Taylor, *The Transformation Revolution: 1815-1860* (New York: Rinehart and Company, 1951). Taylor's classic economic study contends that industrialization in the United States emerged during the infrastructural projects conducted through the "American System." Taylor argues that industrialization was based on modes of transportation, which eased travel and communication, while providing the necessary framework for the movement of peoples and goods.
[42] Juliette Kinzie, *Wau-Bun the "Early Days" in the Northwest* (Chicago: Derby and Jackson Publishers, 1856), 1.
[43] Bright, *Native American Place Names of the United States*, 3-5.
[44] Solzman, "Chicago Portage," *The Encyclopedia of Chicago*, 641. See also: Donald Miller, *City of the Century: The Epic of Chicago and the Making of America* (New York: Simon and Schuster, 1997).
[45] Keating, *Rising Up from Indian Country*, 36.

Chicago Portage, facilitated population increase and heightened tensions between US citizens and indigenous peoples.

Chief Black Hawk, born *Makataimeshekiakiak*, led and defended the Sauk tribe of the northern Midwest against the American invasion and settlement.[46] Although not a hereditary chief, he had inherited a medicine bundle that propelled him to the leadership of a major Sauk band. In 1804, the US, under William Henry Harrison, signed the Treaty of St. Louis with the Sauk and Meskwaki which bounded the Fox, Rock, Illinois, Mississippi, and Missouri rivers under American control.[47] Many within the Sauk leadership, Black Hawk included, felt betrayed by this treaty and the resentment festered for eight years. Black Hawk's political positioning within the Sauk tribe allowed him to negotiate an alliance with British forces in the region, to leverage the potential of river access for military assistance.[48] During the War of 1812, Black Hawk and the British fought against the US. That conflict, along with American expansionist desires, intensified after the war's end in 1815. The Sauk and other indigenous allies, retreated to Iowa with their remaining forces, hoping to regroup and strike again. The war split the Sauk and the supporters of the St. Louis treaty, but Black Hawk retained a loyal following. With vivid memories of the war, hostilities between the Sauk and the Americans escalated during the 1820s as both sides sought retribution and access to the landscape.

In April of 1832, the Sauk returned to Illinois to challenge American presence in the region, and the disregard for Native practices of gift-giving in maintaining alliances. This began

[46] Translated to English from Sauk reads "to be a large, black hawk. See: William Bright, *Native American Place Names of the United States* (Norman, OK: University of Oklahoma Press, 2004), 66.
[47] William Henry Harrison, *Treaty of St. Louis* (Washington DC: US Government Printing Offices, 1804) in: Charles J. Kappler, ed., *Indian Affairs: Laws and Treaties, Vol. III* (Washington DC: US Government Printing Offices, 1813).
[48] Black Hawk, *Autobiography of Makataimeshekiakiak* (J.B. Patterson, trans., 1882), 2.

the conflict known later as the Black Hawk wars.[49] Believing that they could re-take the lands ceded in the Treaty of St. Louis, the Sauk engaged US forces, settlers, and Native allies near the Chicago River and the shores of Lake Michigan. Hoping to again secure British support, and stoke American concerns of reinforcements, Black Hawk proclaimed his combatants the "British Band."[50] US forces and American colonials under General Henry Atkinson and militia colonel Henry Dodge claimed victory, mounting a rousing defense at the Battle of Fort Dearborn near the mouth of Lake Michigan.[51] Keating notes in her work that indigenous allies, and the connections forged by former fur-traders including Kinzie, also helped defend many settlers from further conflict. Alliances protected families long after the wars had ended.[52] Cholera, however, proved to be the most devastating combatant in the Black Hawk wars.[53] American colonial agents and settlers waged a brutal war against the indigenous residents of northeastern Illinois, but they too underestimated the toll that diseases would take on their imperial endeavors.

The State of Illinois, the US military, and settlers had considered the threat of contaminated river water even before hostilities began. In 1829, the State convened a special commission to discuss the potential of a new waterway to facilitate both commercial transportation and sewage disposal.[54] Swampy terrain and low elevation made waste-removal difficult. The Chicago River and Portage also possessed little to no current needed to move refuse; coagulation occurred. In March, the Illinois General Assembly, in conjunction with the

---

[49] James Lewis, "The Black Hawk War of 1832," *The Abraham Lincoln Digitalization Project* (DeKalb, IL: Northern Illinois University Press, 2007). This series of conflicts is now generally referred to as the Black Hawk Wars.
[50] Black Hawk, *Autobiography of Makataimeshekiakiak* (1882), 3.
[51] Letter from Anna Penrose to Fred Penrose, 18 August, 1832, Chicago Historical Society Special Collections, Ft. Dearborn Collection (1830-1834), "Anna Penrose Letters," Box 1, Folder 2.
[52] Keating, *Rising Up from Indian Country*, 140.
[53] Letter from Anna Penrose to Maj. William Whistler, 25 November, 1832.
[54] The Illinois and Michigan Canal Commission, *Minutes of the Illinois and Michigan Canal Commission* (1829-1850), "Minutes of the Board, 22 December, 1829" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1829), 2.

US military, formed the Illinois and Michigan Canal Commission (IMCC). In December, the Canal Commission commenced plans to construct a waterway joining the Mississippi River with Lake Michigan.[55] In March of 1830, the IMCC, acting with "national intelligence officers," met in Springfield, the state capital, to solidify plans to assist in transporting supplies and provisions to soldiers stationed at Fort Dearborn on the shores of Lake Michigan.[56] The State of Illinois and military leaders in Washington focused the military usefulness of a new interstate canal. Recent conflicts with indigenous nations and defense of a growing population likely influenced this interest. Thus, national defense framed the initial purpose of the Illinois and Michigan Canal (I&M Canal).



Figure 3: John Melish, "Map of Illinois," A Geographical Description of the United States (Philadelphia: John Melish, 1802), courtesy of David Rumsey Map Collection Cartography Associates.

[55] The Illinois and Michigan Canal Commission, Minutes of the Illinois and Michigan Canal Commission (1829-1850), "Minutes of the Board, 23 December, 1829" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1829), 5.
[56] Illinois and Michigan Canal Commission, *Minutes of the Illinois and Michigan Canal Commission* (1829-1850), "Meeting of the Illinois and Michigan Canal Commission Concerning Waterways, 19 April, 1830" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1830), 7.

The IMCC set to work organizing the process for canal construction. On September 21, 1830, contract negotiations began between the IMCC and potential construction companies.[57] The Illinois General Assembly reinvested lands sold to the IMCC from local investors and residents in a trust.[58] The IMCC, with guidance from the Illinois General Assembly, then formed a board of trustees to manage the land grants owned collectively in the trust. Beginning in June 1830, the IMCC's Board of Trustees managed all operational procedures involving canal work, including the hiring of new contractors, acquisition of new lands and equipment, and management of worker pay.[59] As new residents continued to settle the region, the need for a new transportation highway intensified. Tensions also increased between the indigenous population and the area's new settlers, forcing the garrison at Fort Dearborn to assist in transportation logistics by offering troops as workers and equipment. As a result, the Board of Trustees delayed their move from Ottawa, Illinois to Chicago for security.[60] Portions of the handwritten meeting minutes are illegible and it remains unclear why Ottawa was chosen, specifically. Board of Trustees president, Edmund Roberts, attempted to expedite the IMCC's move to Chicago and urged the "Commission to act swiftly in accordance with the operations," in an attempt to pressure other Board members to comply.[61] Board of Trustees members debated how to quickly

[57] The Illinois and Michigan Canal Commissioners, *Minutes of the Illinois and Michigan Canal Commission*, "21 September, 1830" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1830), 10.
[58] Ibid.
[59] The Illinois and Michigan Canal Commissioners, *Minutes of the Illinois and Michigan Canal Commission*, "Meeting: Board and President Adjournment, 1 June, 1830" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1830), 47.
[60] The Canal Commissioners Board of Trustees, *Minutes of the Illinois and Michigan Canal Commission*, "Ottawa, 5 October, 1830" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1830), 90. The Board of Trustees, led by president Edmund Roberts, collected their own set of meeting records, separate from the larger Canal Commissioners. The Board of Trustees met more often and only had to convene the entire organization of Commissioners when a major vote occurred.
[61] The Illinois and Michigan Canal Commissioners, *Minutes of the Illinois and Michigan Canal Commission*, "Meeting: Board and President Adjournment, 25 June, 1830" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1830), 124.

transport construction materials and workers. Disagreements also emerged over which contractors to enlist for transportation.

Some Board members knew that the financial stability of the region, which included a major military installation, depended upon viable transportation networks and access to larger rivers. Thus, Roberts' proposals in early Board meetings reflected the urgency of the situation.[62] Although investors and settlers found travel to the area easily via the lake, a canal remained necessary to access to grain and lumber in Central Illinois proved vital to accessing the region's economic potential.

Realizing the vision of a commercial waterway proved difficult. The Board of Trustees, meeting in Springfield in 1832, determined that construction of the proposed I&M Canal required additional security.[63] Supply lines traveled through lands owned by various indigenous groups, lands which they had supposedly secured through the Treaty of Greenville. Native nations, however, believed that the treaty had reaffirmed their sovereignty, as mentioned previously. Nonetheless, the IMCC sought to expedite the planning for construction despite the risk of further armed conflict.[64] During the Black Hawk War, construction of the I&M Canal stalled, but the IMCC, with support from the Illinois General Assembly and Congress, consolidated its leadership and finalized construction contracts. Victory over the indigenous military coalitions hastened the pace at which engineers and the Board of Trustees proceeded.

Heavy travel to the area between 1780 and 1830 created a pathway across the portages from the Des Plaines River to the Chicago River. Although Lake Michigan offered the primary

---

[62] The Illinois and Michigan Canal Commissioners, *Minutes of the Illinois and Michigan Canal Commission*, "Meeting: Board and President Adjournment, 30 June, 1830" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1830), 152.
[63] The Board of Trustees of the Illinois and Michigan Canal Commission, "Meeting: Springfield, 23 July, 1832" *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commission* (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1832).
[64] Ibid.

transportation route to the area, many travelers still used the Portage. Foot, boat, and animal traffic carved deep trenches in the earth that filled with water during rainy months, completely linking the area's waterways together.[65] During those same periods, particularly during the spring and summer, water from the Chicago River eventually flowed through these gutters, intensifying the connection between the river and portages, creating a slight reversal in the stream's flow.[66] As floods occurred, the Chicago River's waters filled the gutters and inundating rainfall generated a current. The flooded gutters allowed for year-round travel that negated the need for heavy summer rains to traverse the portages. A continuous waterway emerged, carved by the weather, animals, and human determination. This unintended channel served as a template for the IMCC's project, reinforcing the need for both a canal and improved riverine management.[67]

Although the region's ecology supported new development and relatively easy travel, the landscape did not offer the potential for effective waste removal. The continental divide, a ridge of hills to the west of the Chicago settlement, what is today 3100 W. 31st street, trapped flood waters and waste near the Chicago River and the village's near one-hundred residents' homes.[68] This divide, as with the others on the continent, separated river flows on either side of it. To its east, the Chicago River flowed toward Lake Michigan where the Des Plaines flowed west on the opposite side. Swampy terrain surrounding the Chicago River also prevented water flows needed to adequately drain the region.[69] Area streams flowed slowly and the ridgeline funneled water to the south and west toward the wooded lands surrounding the Des Plaines River. These

[65] Solzman, "Chicago Portage," *The Encyclopedia of Chicago*, 641.
[66] Ibid.
[67]All abbreviations, shown in parentheses, appear to maintain consistency, clarity, and brevity throughout the work. The main title, term, or name used to identify something, appears in full first followed by the abbreviation thereafter.
[68] United States Census Bureau, 1830 Census-Returns of the Fifth Census; Or Enumeration of the Inhabitants of the United States (Washington D.C.: Duff Green Printers), 37.
[69] Grady, *The Great Lakes*, 49.

geographic boundaries meant that new settlers had few options for refuse disposal.[70] Out of desperation, Chicago's residents simply deposited wastes near homes or the small creeks around their homesteads.

The Chicago River, however, served as the primary human and non-human waste repository.[71] Efforts to build the I&M Canal also led to the IMCC's incorporation of Chicago as a city in 1833. This new "canal town," as many area residents referred to such municipalities, attracted further investment as plans for the canal emerged.[72] Boosters used the proposed canal to lure businesses to the young city, promising efficient transportation and access to regional resources.[73] Historian William Cronon, in his work *Nature's Metropolis*, detailed these linkages to area natural resources and their shipment to market as a primary source of Chicago's financial rise.[74] Lumber and grain, primarily, represented two commodities needed most in establishing Chicago as a viable city. The I&M Canal promised to transport those goods more easily. The Chicago Portage provided an ecological basis for the city's founding. Harnessing natural resources offered a basis for expansion.

Water-borne illnesses threatened to halt political stability and commercial growth. Anglo-American settlers viewed their confrontations with cholera, specifically, as an extension of the war they had just fought against the Sauk. Benjamin and Jacob Barker, two brothers and early

---

[70] The Sanitary District of Chicago, *A History of the Chicago Sanitary and Ship Canal* (Chicago: City of Chicago Publishers, 1924), 21.
[71] For a near comprehensive study of social relations and sanitation in urban environments, see: Harold Platt, *Shock Cities: The Environmental Transformations of Manchester and Chicago* (Chicago: The University of Chicago Press, 2005), 101. Platt contends that the dual "shocks" of pollution and social inequity created a paradox for national political and economic leaders in both the US and Britain. Reconciliation of these two challenges constituted the primary efforts of American and British reformers.
[72] The Illinois and Michigan Canal Commissioners, *Minutes of the Illinois and Michigan Canal Commission*, "Meeting: Board and President Adjournment, 12 October, 1833" (Springfield, IL: State of Illinois Publishers, Illiniois State Archives, 1830), 78.
[73] Andreas, *History of Chicago*, 69.
[74] William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton and Co., 1991), 110.

financiers of white settlement near Fort Dearborn, wrote of "Indian cholera," and the spread of the disease from "confrontations between the whites and Indians."[75] Barker illustrated how the US military occupation remained necessary to protect settlers not only from further conflicts with Native Americans in the region, but also to more effectively treat diseases in the area.[76] Settlers, "confined to the fort…approved the occupation," according to Barker, to bolster quarantines needed to combat cholera.

American colonials living near Fort Dearborn, including Anna Penrose, wrote about the toll that cholera took upon the communities in the area. Penrose wrote to US Army Major William Whistler, that nearly "a man every day has died" from cholera in an encampment near her family since the war had ended.[77] The portages, lakes, and streams that composed the landscape between the Des Plaines River and the Lake Michigan shoreline, provided valuable water sources, but also cholera incubation. For many other settlers, including Benjamin Barker, noted in a letter to his brother Jacob that the area near Fort Dearborn and the mouth of the Chicago River had "become of place of great burden." As a result of "contaminations" he had "struggled to make life comfortable for my little family."[78] Although cholera arrived in 1832 via settlers traveling to Chicago on Lake Michigan, it quickly infected waters needed for both transportation and the irrigation of crops. This situation rendered life in the region tremendously difficult. Nonetheless, the US gained a valuable position after its victory in the Black Hawk War. The diseases that spread following the conflict, was the price for the commercial potential that existed along the Chicago portages and river. Barker himself recognized this, stating that the

[75] Letter from Benjamin Barker to Jacob A. Barker, esq., 19 July, 1830, Chicago Historical Society Specially Collections, Ft. Dearborn Collection (1830-1834) "Jacob A. Barker Letters," Box 1, Folder 3.
[76] Ibid.
[77] Letter from Anna Penrose to Maj. William Whistler, 25 November, 1832 (Chicago Historical Society Special Collections, Ft. Dearborn Collection, 1830-1834), "Jacob A. Barker, Esq. Letters," Box 1, Folder 3, 1.
[78] Letter from Benjamin Barker to Jacob A. Barker, esq., 13 March, 1833 (Chicago Historical Society Special Collections, Ft. Dearborn Collection, 1830-1834), "Jacob A. Barker, Esq. Letters," Box 1, Folder 3, 1.

landscape held "stability and plenty for food and sustenance."[79] Easy access, and plentiful resources pushed the settlers of Fort Dearborn forward, and continued to attract more settlers throughout the 1830s.

American settlers' confrontation with cholera was an early environmental experience that connected the landscape and the people who lived there. Letters written by the Barker brothers and Anna Penrose show that settlers saw a link between indigenous peoples, their former enemies, and disease. Penrose's assumptions about cholera were ironic given its importation by colonial agents. Military control of the region between 1833 and 1837, as a colonization project, was an early attempt to restrain an unpredictable landscape and peoples perceived as threats. Management and use of the region's riparian ecology represented the first task in ensuring safety from the environment and people linked to disease. The Chicago Portages, long used by the region's indigenous nations, offered a potential new highway linking Northern Illinois with the Mississippi. Opened in 1821, the Erie Canal provided the primary transportation linkage between the Eastern Seaboard and the Great Lakes. Steamships, carrying hundreds of eager travelers, sailed on Lake Michigan for the enticing financial and real estate opportunities in Chicago. Offering an option for westward movement and connection with the Mississippi River, however, remained essential. US Army General Henry Atkinson recognized this urgency, and the long-suggested plan for a canal, early in the region's occupation. Atkinson ordered that engineers survey the landscape and offer suggestions for an engineered waterway.[80]

[79] Letter from Benjamin Barker to Jacob A. Barker, Esq., 27 May, 1833 (Chicago Historical Society Special Collections, Ft. Dearborn Collection, 1830-1834), 1.
[80] The Illinois and Michigan Canal Commission, *Minutes of the Illinois and Michigan Canal Commission* (1829-1850), "Minutes of the Board, 17 December, 1829" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1829), 1.; Letter from Benjamin Barker to Jacob A. Barker, Esq., 27 May, 1833.

Chicago's access to Lake Michigan and the interior Illinois prairie brought new commercial opportunities and the need for better infrastructure. In addition to providing a needed transportation waterway, boosters promoted the I&M Canal to move goods and offer a quick sanitary solution.[81] The arrival of cholera in 1832 frightened residents and Chicago's early leadership. Soldiers guarding Ft. Dearborn had brought a virulent epidemic and caused widespread panic among inhabitants. Upon Chicago's incorporation in 1833, the city passed its first sanitary regulations that included the dumping of wastes in public areas or in the Chicago River.[82] Its population was around 150. Over the course of the ensuing year, new residents arrived by the hundreds each month, requiring the construction of hastily built housing. In addition to the rapid expansion of the city's built environment, residents became careless in their sanitary habits.[83] In 1834, Chicago established the Committee of Vigilance to inspect premises and mitigate problems associated with poor waste disposal practices. This committee also helped create the first Chicago Board of Health to assign doctors to treat the sick and secure medical facilities.[84] Despite Chicago's efforts to establish sound sanitary practices, rapid population growth stymied the development of necessary preventive measures including the burial of the dead.[85] The Committee of Vigilance also proposed improving water distribution throughout the city, but rapacious growth strained the public wells established. By 1835, Chicago's population neared 1,000.[86] Both burial practices and water quality remained significant issues left unaddressed by the city's first confrontation with cholera.

---

[81] The Illinois and Michigan Canal Commissioners, "Illinois and Michigan Canal Construction Contracts (Registers), 1836-1848" (Springfield, IL: State of Illinois Publications, Illinois State Archives, May 19, 1837), 197.
[82] Constance Bell Webb, *A History of Contagious Disease Care in Chicago Before the Great Fire* (Chicago, University of Chicago Press, 1940), 28.
[83] Ibid., 29.
[84] William K. Beatty, "When Cholera Scourged Chicago," *Chicago History*, Vol. 11, 1., Spring 1982, 4.
[85] Webb, *A History of Contagious Disease Care in Chicago Before the Great Fire*, 29.
[86] Isaac D. Rawlings, M.S.,M.D., *The Rise and Fall of Disease in Illinois: In Two Parts* (Springfield, IL: The State Department of Health, 1927), 90.

Water-borne illnesses and waste disposal emerged as combined threats to the young city. Although boosters, settlers, and investors recognized the urgency of water drainage and commercial transportation, they could not anticipate how rapidly the region's population would increase. Between 1830 and 1840, Chicago's population rose from 100 residents to nearly 4,500.[87] The City Council commissioned the Chicago Hydraulic Company, a private entity, in January 1836. Chicago's municipal leadership tasked the company with constructing a cast-iron pump and water mill in the central financial district in 1840. This began a long exchange between private companies and public agencies regarding the administration of Chicago's sanitary infrastructure. Commissioning of this company represented one of the earliest instances of the privatization of Chicago's sanitation services. The primitive mill, built by the Hydraulic Company, used wooden pipes to deposit lake water into treatment containers distributed by wagon throughout the city. Chicago's riverine ecology, bound by the western portages and glacial lakes, offered the opportunity to address sanitation and disease simultaneously, all while attracting new industries.

Planning and Building a Canal

Representatives from the Illinois General Assembly appointed a commission at Summit, Illinois tasked with funding and building the I&M Canal. Within the commission's meeting records, investors illustrated costs for the canal project, and the development of contracts with private companies. Between June 1837 and July 1838, the commission awarded contracts to some twenty-four private construction companies.[88] Work was delegated to different companies

[87] Robert Morrissey, "Cook County," *The Encyclopedia of Chicago* (Chicago: University of Chicago Press, 2004, by the Newberry Library), 119.
[88] The Illinois and Michigan Canal Commissioners, "Illinois and Michigan Canal Construction Contracts (Registers), 1836-1848", 218.

based on the channels or locks under construction.[89] According to historian Libby Hill, the I&M Canal represented one of the first attempts to not only connect the city with the Illinois River Valley, but to also divert sewage from Chicago.[90] The canal, therefore offered regional boosters the opportunity to market the project as crucial for both transportation and cleanliness, thus enhancing Chicago's attractiveness to area investors. It was during discussions surrounding the I&M Canal that the city's leadership discovered the connection between transportation infrastructure and sanitation.

On July 4, 1836, workers broke ground at present-day Canalport, a village just outside Chicago.[91] To centralize operations, the Board of Trustees moved its offices to the village of Summit, Illinois, the original site of the IMCC's headquarters. Construction of the I&M Canal required establishing several municipalities and communities to facilitate transportation of workers and materiel. Summit, located about sixteen miles from Chicago, was one such town. Its location, essentially half-way along the canal's route, made the new community rather important to the IMCC's project. From this location, the Board met with contractors, and collected resources and construction materials near the Des Plaines and Illinois Rivers. This location, with its closer proximity to major shipping on the Illinois River, also decreased transportation and labor costs. Once moved to Summit, the Board began orchestrating construction operations to cautious optimism.

The I&M Canal project represented an ambitious project amidst a canal boom throughout the country. At ninety-seven miles in length, the proposed waterway would connect the South Branch of the Chicago River, its terminus, with the Des Plaines river, west of the Continental

[89] The Illinois and Michigan Canal Commissioners, "Illinois and Michigan Canal Construction Contracts, (Registers), 1845-1846 (Springfield, IL: Illinois State Publishers, Illinois State Archives, March 30, 1845), 18.
[90] Hill, *The Chicago River*, 102.
[91] Conzen, *The Illinois and Michigan Canal National Heritage Corridor*, 8.

Divide. From there, the Des Plaines would flow west toward its confluence with the Illinois River, which offered direct access to the Mississippi. Other canals would join the I&M in providing linkages between the Great Lakes and the Mississippi River Valley including the Erie and Sandusky-Scioto Canal and the Erie and Maumee-Wabash Canal.[92] Each canal also necessitated the establishment of new cities to accept and transport goods while providing simultaneous access to roads and waterways. Canal towns, therefore, represented tremendous commercial promise.

Historian D.W. Meinig, in *The Shaping of America*, illustrates the importance of canals to providing a national transportation infrastructure both for economic development, but territorial expansion. Treasury Secretary, Albert Gallatin, proposed "improving" the national landscape through the construction of turnpikes and canals. Movement of goods and people meant engaging with regional ecologies; environmental adaptation was both economic and political. Gallatin's plan, according to Meinig, consisted of four parts: parallel land and water traffic-ways along the Atlantic Seaboard, east-west connections between the Atlantic and western rivers, road improvements, and connections between the Great Lakes and the Mississippi.[93] The I&M Canal offered a necessary component of realizing Secretary Gallatin's vision of an "improved" national landscape in service of commercial expansion.

New IMCC Board of Trustees president Jacob Fry, seemingly believed Gallatin's plans for "internal improvements." Fry touted the "material benefits" of the proposed I&M Canal, and ensured "success for investors" once the canal opened.[94] Although the beginning of construction

[92] D.W. Meinig, *The Shaping of America: A Geographical Perspective on 500 Years of History* (New Haven, CT: Yale University Press, 1993). 315.
[93] Ibid., 314-315.
[94] The Illinois and Michigan Canal Commissioners, "Meeting of the Board of Trustees of the Illinois and Michigan Canal Commissioners, 21 August, 1845" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1845).

clearly excited the Board president and others within the agency's leadership, contractual disputes and national economic crises, threatened to halt work.

Fry assumed the task of settling various labor conflicts and IMCC disputes with contracted companies. For example, Darling and Phelps Construction Company, one of the primary contractors, wanted greater insurance for operations on their section of the canal bed near Lockport, south of Summit. Fry assured the company that their work on the canal remained insured and that they would receive additional compensation should the construction timeline or other conditions change abruptly. Since the Board desired rapid completion of the canal, many of the construction companies, including Darling and Phelps, confronted the tensions surrounding conducting hasty work. As new sections of the canal neared completion constructed one at a time, the Illinois General Assembly ordered the Board to allow commercial traffic between Lockport and central Illinois. The Panic of 1837 also threatened to delay transmission of funds to the IMCC. Economic volatility complicated the IMCC's ability to secure construction contracts as the Board could not specify exactly when funds would arrive. Neither the state nor Chicago's investors could hardly wait to access their new transportation highway.

Between 1837 and 1838, cholera struck again. With this outbreak, the primary victims were canal workers, specifically those working on the leading section of the waterway near the village of Bridgeport.[95] Combined with a poor economy, the outbreak further inhibited progress on canal work. Residents also feared venturing to the area to collect workers afflicted with the illness or who had died.[96] Scant documentation of the outbreak remains available, but Constance Bell Webb determined that the strain of cholera that had stricken the Bridgeport workers was likely "not cholera of the usual type, but the doctors considered it a modification of that

[95] Beatty, "When Cholera Scourged Chicago," 4.
[96] Ibid. No newspapers are available from this year to document public, media response.

disease."[97] In what became known as "canal cholera," residents and administrators of the canal project grew concerned about the city's public image. Another outbreak threatened Chicago's growth and stood to potentially discourage new settlers from coming to the young city.

Increasingly complex solutions emerged during the mid-nineteenth century.[98] Between 1835 and 1842, the city established the first engineered responses to water distribution problems and pollution. A hydraulic pumping system and treatment mill constituted the initial drive toward distributing potable water to numerous neighborhoods. These devices helped distribute water more reliably while keeping potable supplies separate from privy vaults and waste sites. Engineers believed it would provide excellent support to the existing wooden water lines, built hastily by local businesses and traders.[99] In *Shock Cities*, historian Harold Platt discusses the operation of these pipes and mills, which the Hydraulic Company powered with steam.[100] Pipes, located along the lakeshore, siphoned water from the lake and held it in iron tanks, near downtown, for use. The centralized location maximized access to water from the lake and ease of distribution to citizens. Platt describes the early public excitement around the new mill. In less than twenty years since Chicago's incorporation, the city possessed a promising new transportation network connecting it with the Mississippi and an impressive water distribution system.

Water mills provided a response to the financial pressure of boosters and local politicians who wanted to ensure a marketable city for new investors and businesses.[101] Andreas celebrated these technological improvements made to the city's water distribution center as "remarkable"

---

[97] Webb, *A History of Contagious Disease Care in Chicago Before the Great Fire*, 31.
[98] Martin Melosi, *The Sanitary City* (Baltimore, MD: The Johns Hopkins University Press, 1999), 262.
[99] Board of Trustees of the Illinois and Michigan Canal Commission, *Minutes of the Illinois and Michigan Canal Commission,* "Meeting: 18 August, 1845," 29.
[100] Platt, *Shock Cities*, 207.
[101] Ibid., 207.

and a "marvel to behold."[102] As a booster, he paid little heed to the criticism of the city's political, financial, and engineering leaders. This technology, however, provided the city's southern division with very little water, as neither Lake Michigan nor the Chicago River provided the necessary currents to propel water through the system. Slow currents caused the water to stagnate, leaving it susceptible to contamination by diseases, including typhoid and yellow fever.[103] While the pipelines provided a reservoir for water, it left Chicago's sanitation issues unresolved.[104] Eventually, affluent Chicagoans condemned the municipal well water and instead accessed private wells and purveyors.[105] Wealthier residents living in the city's central and northern divisions ignored the mill, often obtaining their water from private wells and pumps. Public support, therefore, for the mill waned even as industrial waste increased in the Chicago River.

The map below shows Chicago in 1835 including the original city subdivisions of 1830. Produced by the Illinois and Michigan Canal Commissioners, the map also shows the sandbar that partially shielded the mouth of the Chicago River from Lake Michigan. The original Ft. Dearborn site is located just to the north of the mouth. Most importantly, the map illustrates Chicago's centralized organization even after only two years since its incorporation. The city stood prepared to act as a viable transportation hub and site of commercial exchange.

[102] Andreas, *History of Chicago*, 198.
[103] Platt, *Shock Cities*, 207.
[104] Ibid., 208.
[105] The Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal*, 30. This source is a published review of the Sanitary District's operations during the construction of the Sanitary and Ship Canal sent to the Chicago City Council and the Illinois General Assembly. The report details the District's meetings and goals for the project. It also provides a comprehensive discussion of the engineering methods employed during the canal's construction. This source, however, remains biased toward the District and its purported achievements upon completion of the Sanitary and Ship Canal, which limits its usefulness.

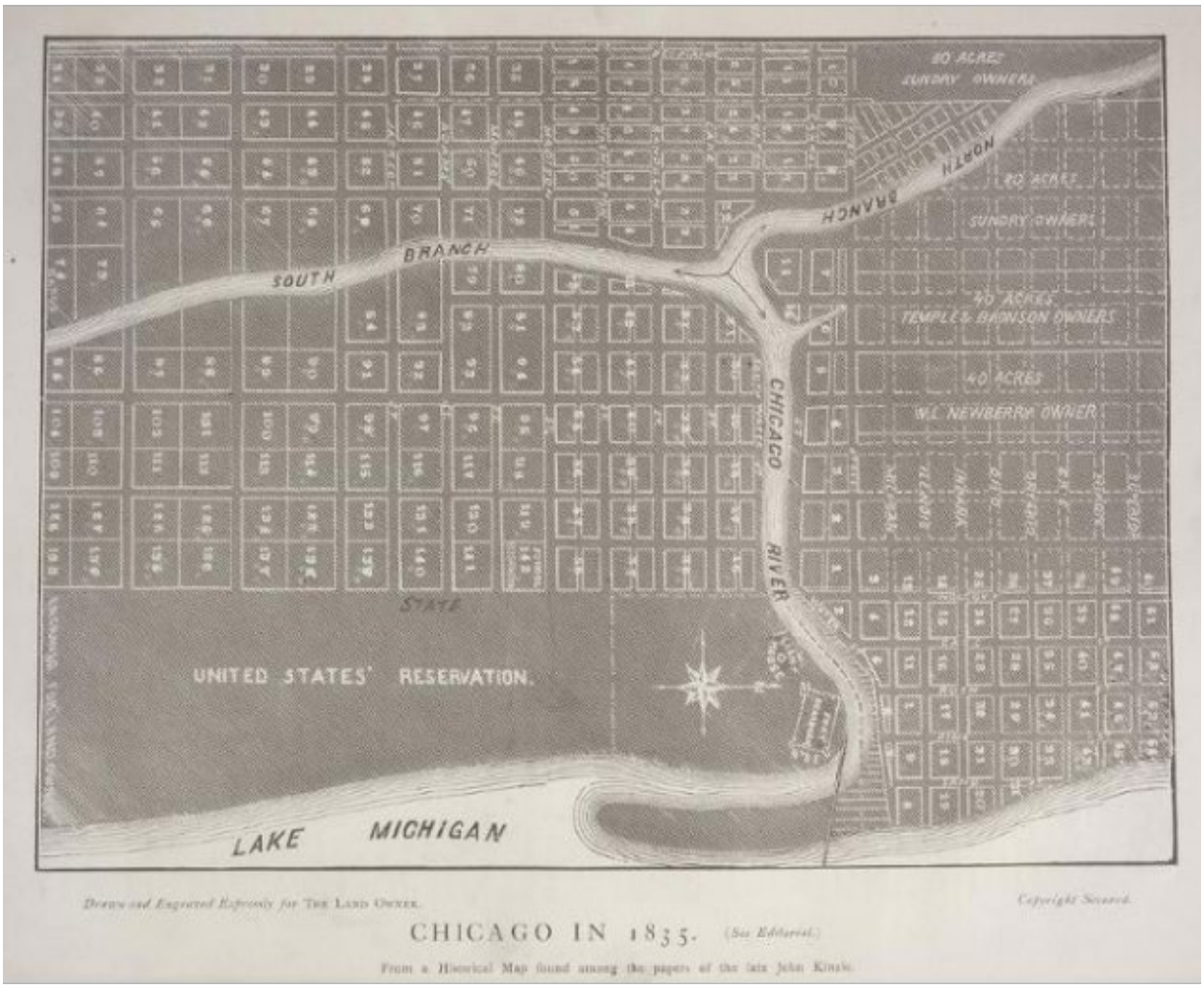


Figure 4: Illinois and Michigan Canal Commissioners, "Chicago in 1835" (Springfield, IL: Illinois and Michigan Canal Commissioners, 1835), Courtesy of the Newberry Library.

By December of 1845, the Board of Trustees granted the continuation of work on the I&M Canal.[106] The individual arrangement of construction contracts thereafter dominated most of the Board's time. Management expenditures also occupied the majority of the Board's budget

[106] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal,* "Notice to the Commissioners, 26 December, 1845" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1845), 27.

between 1845 and 1848.[107] Full-scale construction operations began on December 27, 1845 between Canalport and the source of the Chicago River's South Branch. Board of Trustees Chief Engineer, William Gooding, officiated the work. Construction company Osborne and North led the efforts on the first section of the canal trench. Cold weather, ice, wind, and precipitation slowed construction, but workers navigated these obstacles nearly seven days a week for at least ten hours a day.[108] Contractors working for Osborne and North failed to pay some of their equipment debts to the Board of Trustees, thus slowing work even further. The Board loaned several companies both equipment and money when weather stalled transportation. Roads surrounding the construction site remained largely impassable during the winter months making construction inefficient and expensive.[109] Gooding reported the delinquency to the Board after meeting with the company's representatives near the construction site at Canalport. Already preoccupied with a tight construction schedule, Board president Fry had yet another concern to confront. Once debts were ultimately added by the Board to their construction costs, and supplemented by other companies awarded contracts, construction continued.

Financial disruptions related to fallout from the 1837 Panic and delayed loan approvals remained an issue throughout construction. These obstacles made the canal a more expensive venture than investors originally anticipated. Engineer Gooding also calculated that the canal would likely take another year to complete. Rather than the initial completion date of the Summer of 1847, the Board surmised that the canal would open in 1848.[110] Two additional

---

[107] The Illinois and Michigan Canal Commissioners, *Financial Records of the Board of Trustees of the Illinois and Michigan Canal, 1829-1854*, "Records, June, 1844-August, 1848" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1854), 36.
[108] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal*, "27 January, 1845" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1845), 14.
[109] Ibid.
[110] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "26 February, 1846" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1846), 38.

companies accepted the contract voided by Osborne and North, thus completing the dredging of the Chicago River south and west of Canalport and the Fox River, also to the South and West.

After work stoppages in 1837 and 1841, due to wide-spread economic panics, the canal neared opening by the fall of 1847. During construction, more canal towns and farming communities emerged along the waterway's route. Other municipalities also expanded, further solidifying the canal's economic importance. The IMCC platted one such town, Ottawa, in the 1830s, although it would not be officially incorporated until 1853. Located at the confluence of the Fox and Illinois Rivers, Ottawa was one of the most anticipated canal towns founded. It was at Ottawa that the IMCC believed would be best to join the canal with the Illinois River. Although that location changed to LaSalle, land sales boomed, and Ottawa gained an early edge on its competitors.[111] Grain elevators in Ottawa also allowed nearby farmers to participate in the flourishing wheat markets generated by the completed canal. Chicago's investors also showed great interest in Ottawa as nearby silica deposits promised to help launch manufacturing. Both markets afforded the town immense influence upon the canal's opening.

Workers themselves also established many permanent settlements between Chicago and the town of Joliet that eventually became incorporated communities. Previously worker camps, these towns provided a continuous line of municipalities that were not only the direct beneficiaries of the I&M Canal, but also became financially reliant on the commerce that it promised.[112] These small towns, Summit among them, levied tolls on ships travelling up the Illinois River toward Chicago. Grain and construction supplies consisted of the first shipments,

[111] Michael P. Conzen, *The Illinois and Michigan Canal National Historic Landmark: Boundary and Documentation Improvement Project* (Omaha, NE: National Park Service, Midwest Region, 1999), 63-64.
[112] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "7 March, 1848" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1848), 66.

and although the loads remained relatively light, the access the city gained to regional goods reached a level not seen since Chicago's founding eleven years prior.[113] Eventually, the financial interests of Chicago merged with the commercial goals of many rural communities that built the canal.

Although incomplete, the commercial benefits of the I&M Canal arrived quickly to the region. The IMCC's Board of Trustees immediately sold portions of land surrounding the canal between Summit and Lockport to private individuals to offset the debt accumulated during construction. Ultimately, the IMCC managed the canal's operations upon its completion along with managing the waterway's immense traffic. The Board agreed to portion the land into mile-long segments at the cost of $41,600 over the span of ten miles.[114] Profits from tolls received along the canal were then deposited in the American Exchange Bank and then appropriated to the State of Illinois, annually.[115] Local governments sought to seize upon the new waterway's financial potential and tense competition ensued.

Control of the I&M Canal and its tolling structure elicited further debate as construction neared completion. The IMCC accepted many proposals from the Chicago Common Council (later the Chicago City Council), which had addressed citizen and merchant complaints about noise and street congestion since the waterway's opening. To address concerns about traffic congestion, the City Council supported a county road that would connect Chicago with the banks of the I&M Canal at the confluence with the Des Plaines River, just outside of Lockport. This road, consisting of wooden planks, would make the transportation of goods much easier, while

[113] Chicago Exchange Board, *Annual Financial Records*, "10 March, 1848" (Chicago: City of Chicago Publishers, 1848), 45-6.
[114] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners,* "1 Nov., 1847" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1847).
[115] Ibid.

reducing travel time.[116] Chicago would also have both canal and overland access. John P. Chapin, the recently elected mayor of Chicago, publicly supported further road construction and supported the large thoroughfare to begin at Randolph street in downtown, and move due west toward the Des Plaines River, where it would meet the canal. The Board of Trustees, although in agreement with Chapin's proposed plan, speculated that it might be an elaborate attempt by the city to obtain greater control of the canal and its financial benefits.[117] William B. Ogden, Chapin's predecessor, also offered his public support, further bolstering the agreement between the IMCC and the Chicago Common Council.[118] Such efforts comprised several days of discussion and debate on the Board of Trustees. Between 1 November and 13 November of 1847, these exchanges belied the extent to which Chicago relied upon the canal as a reliable transportation route.[119]

The Illinois and Michigan Canal Opens

Chicago, which controlled the canal's terminus at the Chicago River's South Branch, raised toll duties to meet the rising demand of goods upon the canal's opening. City merchants opposed these new toll charges, which threatened to strain the regional economy.[120] Although the IMCC escaped direct political pressure from toll prices and traffic management, likely because many merchants lacked responsibility for the canal debt, higher supply costs in Chicago reveal the economic connections the canal had made with the city and the state of Illinois. The

[116] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "4 Nov., 1847" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1847), 220.
[117] Ibid.
[118] Ibid.
[119] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "13 Nov., 1847" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1847), 245.
[120] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "3 Nov., 1847" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1847), 238.

I&M Canal brought prosperity. Many communities, along with entrepreneurs, wanted access to a piece of the revenue. Although the canal improved transportation, as many earlier settlers had hoped, it made the state's economic exchanges far more convoluted.

The geological development of the Great Lakes region gave Chicago its prime location and the close, sensitive connections between waterways that allowed for peoples and wastes to travel so easily. Pollution soon caused concern. In 1848, Chicago's population neared 25,000 from 4,000 only eight years earlier.[121] As the city grew, and quickly enveloped the Continental Divide within its limits, space for waste disposal remained scarce. Most early methods used to address water distribution and sanitation failed, justifying the need for improved drainage. Civic officials considered the containment of industrial waste and sewage in barrels, transported via carriages and trains outside the city. These attempts proved highly impractical and people living in the Illinois and Des Plaines River valleys rejected them.[122] Primitive wells offered the first water distribution method, although people manually delivered water in barrels from the lake shore to interior neighborhoods.

In 1848, workers laid tracks for the first railroad. The Galena and Chicago Union Railroad connected the city with the far-northwestern quadrant of Illinois. Chartered in 1836, the railroad offered regional transportation in the opposite direction of the I&M Canal.[123] Travelers and shipping companies could travel and transport goods to the Mississippi River Valley to the north and to the south. In less than twenty years, Chicago had established a transportation hub, making the city and its region increasingly attractive.

---

[121] Dennis McClendon, *Chicago Growth: 1850-1900* (Urbana, IL: University of Illinois Press, 2012), 11-12.
[122] The Sanitary District of Chicago, *A History of the Chicago Sanitary and Ship Canal*, 29.
[123] John C. Hudson, "Railroads," *The Encyclopedia of Chicago* (Chicago: University of Chicago Press, 2004 by the Newberry Library), 676.

The dramatic population increase demanded quick solutions. Although the Commission informed Fort Dearborn and area residents of their canal plans, waste removal proved a more immediate concern.[124] Community leaders dug water wells on the limestone bedrock to collect potable water. The depth of these wells usually did not exceed six and twelve feet. Therefore, wastewater from homes and area grain mills usually found its way into neighborhood streets. The accumulation of these effluents coagulated above ground, seeping into the thin layer of clay beneath the mostly dirt roads and infected wells. Local street crews, using wooden shovels, removed this water and deposited it into the Chicago River. Over time, the water produced an unpleasant odor, resembling a privy vault, that offended anyone near a well or potable water dispenser.[125] Residents continued to access public wells, given that their options for potable water remained limited. Chicago's private water distribution companies also foundered after the national economic panic of 1837.[126] As well-usage surged, many area residents made their concerns known to the city leadership.

Increased canal traffic brought more disagreements to IMCC Board members. Canal control between Chicago and rural communities along the waterway represented the key point of contention. In early 1848, disputes concerning both tolls and land ownership demanded more of the Board's time. Ultimately, the Board ruled that although governing offices for the I&M Canal should remain in Chicago, the Illinois General Assemble should still manage financial concerns and monetary resources.[127] It was also at this point that the Board moved its operational location

[124] Board of Trustees of the Illinois and Michigan Canal Commission, *Minutes of the Illinois and Michigan Canal Commission,* "Meeting: 18 August, 1845" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1845).
[125] Ibid., 27.
[126] Webb, *A History of Contagious Disease Care in Chicago Before the Great Fire*, 28.
[127] The Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "18 Nov., 1847" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1847), 257.

and central offices from Summit to Chicago.[128] Communities along the canal would, however, maintain their rights to tolls and land-ownership, thus maintaining some autonomy in rural towns. This balancing act established a precedent for cooperation between Chicago and downstream municipalities. Financial constraints from the construction project mandated that there be a diffusion of costs to sustain the I&M Canal's management. Both Chicagoans and rural Illinoisans needed the canal, and they needed cooperation to ensure its successful operation.

The I&M Canal made Chicago a nexus of transportation and gave boosters ample marketing power. Newspapers across the country documented the canal's opening. The *Augusta Chronicle* described the project as having marked a "new era in the history of inland commerce in this country."[129] Journalists writing for Washington DC area papers, including the *Daily National Intelligencer* and the *Alexandria Gazette*, also described the I&M Canal favorably. The *National Intelligencer* noted that the canal would be "the best for the Union."[130] The national coverage also acknowledged, through their Illinois correspondents, that towns "were building all along the canal," and that Chicago itself had erected six-hundred new warehouses and commercial structures in anticipation of the increased boat traffic.[131] The *New York Evening Post* surmised that the I&M Canal would increase lumber demand between St. Louis and Chicago.[132] The I&M Canal allowed for Chicago's rapid expansion by intensifying its connection to rural communities and raw materials located there. This engagement also made rural towns more economically and politically influential. The *Evening Post* reported that "towns along the Illinois (River) will assist in meeting the demand," while greatly bolstering their own commercial

[128] Ibid.
[129] "Illinois Canal," *The Augusta Chronicle*, 6 Mar., 1848.
[130] "Illinois and Michigan Canal," *Daily National Intelligencer*, 6 Mar., 1848, "Illinois and Michigan Canal," *Alexandria Gazette*, 7 Mar., 1848.
[131] "Illinois and Michigan Canal," *Daily National Intelligencer*, 1848.
[132] "Illinois and Michigan Canal," *New York Evening Post*, 22 Mar., 1848.

influence. Thus, the paper remarked that toll "prices might be high" for lumber, to meet the demands in "Alton, St. Louis, and Chicago."[133] Rural towns benefited from these tolling prices.

National coverage of the canal's opening was accurate. Merchants immediately increased their demands for lumber, grain, and household goods, thus generating greater boat traffic and increased revenue for towns along the Illinois River.[134] Excitement about the canal's economic potential, recorded in regional news media, created optimism surrounding the Midwest's commercial development. Location proved most important; something that secured Chicago's founding and its anticipated growth.

The canal utilized the confluence of the Chicago and Des Plaines rivers to offer continuous riparian travel from the Gulf of Mexico to Lake Michigan.[135] Although ease of access and plentiful natural resources cemented Chicago's commercial potential, its proponents knew that improvements in infrastructure would make it competitive with other Midwestern cities, particularly St. Louis.[136] The I&M Canal initiated the first of those improvements and generated substantial growth in towns along the Illinois River, including Ottawa and Peoria. Once construction ended, Chicago controlled the canal and much of the merchandise it transported.[137] Soon, as the waterway facilitated connections between rural communities and urban merchants, farmers began trading their crops in Chicago.[138] With its growth as a railroad center, Chicago

[133] Ibid.
[134] "New and Important Channel of Trade," *Mississippi Free Trader*, 22 April, 1848.
[135] Conzen, *The Illinois and Michigan Canal National Heritage Corridor*, 9.; Robin L. Einhorn, *Property Rules: Political Economy in Chicago, 1833-1872* (Chicago: University of Chicago Press, 1991), 26.; For Figure 1, see: Michael P. Conzen and Kay J. Carr, eds., *The Illinois and Michigan Canal National Heritage Corridor: A Guide to its History and Sources*, Chapter 1, "The Historical and Geographical Development of the Illinois & Michigan Canal National Heritage Corridor" (DeKalb and Chicago: Northern Illinois University Press, 1988), 12.
[136] Platt, *Shock Cities*, 102.
[137] Conzen, *The Illinois and Michigan Canal National Heritage Corridor*, 11.
[138] Ibid., 11-2.

took financial command of the region and surpassed St. Louis as the favored transportation and economic hub of the Midwest.[139]

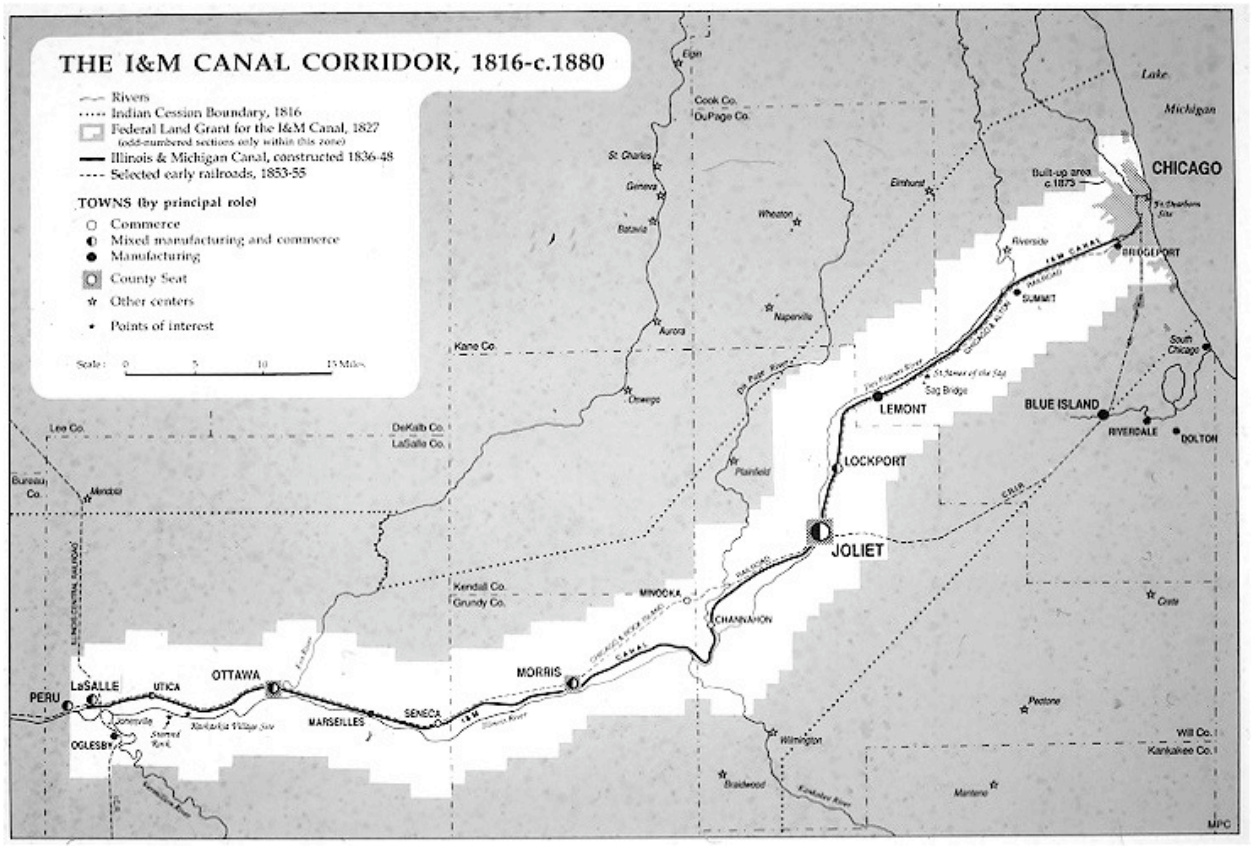


Figure 5: Map Courtesy of Michael Conzen, (Conzen, 1988).

The I&M Canal made Chicago financially attractive, having improved its connections with rural lumber, grain, silica, and coal markets, but Illinois River Valley towns also flourished. Rural prosperity also generated competition with the city for control of canal revenue. Chicago became intertwined, further, with rural areas and with the state of Illinois, which maintained a firm grasp of the purse strings. Any negotiation of the canal and of the commercial transactions

[139] Ibid., 13.

involved, would require an intricate engagement with individual communities and the Illinois General Assembly. This precedent remained throughout the nineteenth century and beyond. Nonetheless, the I&M Canal stabilized the regional economy and created commercial linkages to Chicago throughout the Midwest. These connections proved positive for the city and its rural partners. People travelled to Chicago and towns along the canal in search of work. Chicago's population swelled along with the state of Illinois. By 1850, Chicago reached a population of 59,000.[140]

As river traffic on the Mississippi and Illinois Rivers increased, so too did usage of the I&M Canal. Indeed, as more commercial travel reached Chicago, the State of Illinois, with Congressional funding, ordered the expansion of the Chicago harbor to accommodate heavier shipping.[141] Renovations to the harbor required removal of a large sandbar, some 4,600 cubic feet of material, that blocked boats travelling from the I&M Canal and up the Chicago River to Lake Michigan.[142] It was there that dock workers brought goods from boats to new rail lines along Michigan avenue. In addition to widening the harbor, the Illinois General Assembly also mandated a widening and deepening of the Chicago River near its connection with the I&M Canal to facilitate larger ships.[143] The Chicago City Council also ordered that streets be shifted further west to allow for wharfing lots. Businesses associated with river shipping also built new warehouses along the river and near the new harbor and about 1,500 feet of dock designed to "work on the main river, on a direct line with that already completed, to the North Branch, forming at the junction a most…extensive basin."[144] The *Chicago Daily Tribune* reported that

[140] McClendon, *Chicago Growth*, 12.
[141] Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 50.
[142] "Improvements of 1850," *Chicago Daily Tribune*, 2 December, 1850.
[143] Ibid.
[144] Ibid.

great "convenience is experienced by the shipping in consequence of the excavations already made."[145] Chicago maximized the potential of the I&M Canal as a result of the improvements made to its river, harbor, and wharfs.

With demographic growth came sanitation problems, which reinforced the importance of public service endeavors in expanding the city's attractiveness. As Chicago's population ballooned from 18,000 in 1845 to 59,000 by 1850, the streets and sidewalks amassed greater amounts of sewage.[146] The sanitary situation only worsened in 1849. That year, cholera returned. The third pandemic of the disease occurred in India three years earlier. By the spring of 1849, it ravaged the eastern US. Access to the Mississippi River, via the I&M Canal, meant greater contact with major shipping ports to the south and east. According to contemporary newspaper accounts, cholera had arrived when the ship *John Drew* reached Chicago on April 29 from New Orleans.[147] The city had made significant attempts to prepare for another cholera outbreak, but with a significantly larger population, waste-disposal proved difficult. On January 29, the Chicago Common Council had approved a citywide cleanup effort by owners and occupants of all dwellings. By April, the City Council appointed 45 assistant health officers to assist in refuse removal.[148] Residents disagreed about the severity of the outbreak and distrusted public officials regarding precautionary measures.[149] Cholera spread rapidly amidst the city's cramped living conditions, standing wastes, and fouled water. In August, cholera infected 1,000 residents and

[145] Ibid.
[146] Platt, *Shock Cities*, 98.; Dennis McClendon, "Chicago Demographic Growth," *The Encyclopedia of Chicago* (Chicago: The Chicago Historical Society, 2004).
[147] Beatty, "When Cholera Scourged Chicago," 5.
[148] Ibid.
[149] "Joy to the World: Diarrhea, Dysentery, Cholera: Kirby's Cholera Drops," *Chicago Daily Democrat*, 7 June, 1849, 3.

killed 300.[150] By October, it had claimed another 678 lives, totaling 978 deaths and 3% of the population.[151]

As with its earlier outbreaks, cholera had produced a significant panic throughout the city. Residents' fear threatened the city's image and further financial development. In 1850, the city of Chicago planked some 9.59 miles of streets and roads within its limits, an increase of nearly three feet from the previous year.[152] New pavement, regrettably, did not adequately defend against the increasing amount of waste the citizenry produced. Chief among the pollutants that year were human and animal feces. Given the absence of a sewer system in 1850, people simply dumped fecal matter in the streets where it either coagulated in the dirt or washed into the Chicago River during heavy rains. Eventually, feces traveled into Lake Michigan via the river. Both human and animal urine moved about the city similarly. As Chicago's industry expanded, offal and acids, used by packing houses to dissolve carcasses, mingled with feces, urine, and animal corpses. Given these continued challenges, cholera raged in Chicago for another five years. In 1850, 420 had died and in 1851, another 216.[153]

Infrastructural improvements, as documented by the *Chicago Daily Tribune*, largely assisted the central business district along State, Wells, and Randolph streets. The South Side of the city largely remained underserved by these improvements. Many of the public works projects ordered by the City Council between 1849 and 1850, shifted priority to transportation. Most important were avenues that provided a direct link between the I&M Canal and the Chicago Harbor.[154] This material polluted the city's only sources of drinking water and produced an

[150] Beatty, "When Cholera Scourged Chicago," 6.
[151] Ibid., 7.
[152] "Improvements of 1850," *Chicago Daily Tribune*, 1850, 1.
[153] Beatty, "When Cholera Scourged Chicago," 8.
[154] "Improvements of 1850," *Chicago Daily Tribune*, 1850, 1.

unbearable stench, particularly in the increasingly cramped, working-class neighborhoods on the South Side. According to local Chicago media, the planking of the city's streets cost taxpayers just over $23,000. Road construction, however, did not consume most Chicago's resources during the year.

Although the City Council quickly responded to waste in the I&M Canal, the *Tribune* noted the impermanence of the solutions offered. Sewer mains, as the paper noted were largely made of oak and did not "subserve the desired end" of cleaner water.[155] The author stated that in "relation to sewerage," the *Tribune* was "entirely opposed to the present plan" of wooden sewer mains and streets.[156] Nonetheless, the paper's staff writers, according to the article, remained confident that the "slower progress in the improvements above…resulting in more durable materials, we are satisfied is the true policy of the city."[157] Permanent sanitation solutions, according to the *Tribune*, was the true goal of the Common Council. Until that point, residents continued to use the I&M Canal and the Chicago River as their primary sewer.

Residents disposed garbage and other domestic wastes in the same fashion as urine and feces, adding to the polluted cocktail that inundated streets and waterways. The city's relatively low elevation often meant that floods occurred frequently, which deposited wastes into neighborhoods that lined the Chicago River, hindering travel and sanitation.[158] Standing water also attracted disease-carrying insects and rats, especially in areas near the river on the south and west sides. Canal and river water had coagulated amidst the city's waste causing stoppages in drainage. This made travel to the city center difficult.[159] Road improvements mitigated the

[155] Ibid.
[156] Ibid. Author not stated in the article title or text.
[157] Ibid.
[158] Platt, *Shock Cities*, 99.; Chicago's elevation above sea-level is 673 feet. Figure courtesy of United States Geological Survey, "Elevations and Distances in the United States," egsc.usgs.gov, accessed: 6 March, 2015.
[159] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 53.

effects of this problem, but the stench and concerns about cholera soon consumed the city's political leadership. Although both branches of the river and the I&M Canal suffered this dumping, there were specific segments of the city's waterways that had been degraded more rapidly.

Particularly contaminated was the South Branch of the river, nearest the shipping ports and the lumber mills. The South Side of the city had easy access to the I&M Canal and the wharfs. From there, dock workers could transport goods to merchants in the city's center. This location also meant that much of the industrial waste remained in the South Branch and on the South Side. Print media documentation of public improvements in 1850, also noted the contamination in the South Branch. The City Council and the IMCC, decided to dredge the I&M Canal and the Chicago River South Branch to allow for greater water flow.[160] Despite stated intentions, the City Council chose to make water-breaks in the harbor a chief priority. If Chicago residents wanted to project a clean and safe image for their city to enhance commercial development, these problems required attention.

By the end of 1850, the Board of Water Commissioners and the Board of Sewerage Commissioners had been established, by both the administration of the Common Council and the Illinois General Assembly. Cholera had also claimed 420 lives by year's end.[161] Both agencies set to work addressing Chicago's waste-removal problems. One of their bolder suggestions involved the construction of a subterranean tunnel that would siphon fresh lake water to inner-city neighborhoods; it garnered significant attention from civic leaders as it was cheaper and

[160] Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "5 Dec., 1850, (Springfield, IL: State of Illinois Publishing, Illinois State Archives, 1850)., "Improvements of 1850," *Chicago Daily Tribune*, 1850.
[161] Beatty, "When Cholera Scourged Chicago," 10.

required little maintenance.[162] Civil engineers also concluded that another similar tunnel would provide relief from many of the noxious odors related to sewage.[163] These tunnels would transport polluted water underground, eliminating the possibility of direct contact with residents, while providing potable water. This subterranean configuration also potentially protected against any interference with navigation on city-streets, the river, or the lake. Despite the promising solutions, the city's civil engineers and sanitarians required further guidance on the design of such projects and looked to eastern cities, including New York, Philadelphia, and Boston, for advice.

Conclusion

A survey of the city's commercial growth in 1850 appeared in the *Tribune*. Chicago's renowned status as a transportation hub had emerged. Mentioned specifically in the article was the overwhelming contribution of the I&M Canal to the city's financial success. The author noted that the "three great sources of and avenues of commerce are the Lakes, the Illinois and Michigan Canal, and the Galena and Chicago Railroad."[164] Lumber, sugar, and grain comprised the largest share of goods shipped on the canal and far outpaced even the highest volume of material transported on the lake or rail lines.[165] Indeed, in the year 1850, these goods numbered well over 110,000 pounds. Grain shipments decreased in 1850, largely due to a drought-induced shortage throughout the Midwest. Most suppliers, however, focused their shipments toward Chicago, as noted in the paper. The Board of Trustees, according to a *Tribune* journalist, lowered tolls between Ottawa, and Lockport, which helped to ease shipments to Chicago. Casting the

[162] "Improvements of 1850," *Chicago Daily Tribune*, 1850.
[163] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 48.
[164] "Annual Review of the Trade and Commerce of Chicago for the Year 1850," *Chicago Daily Tribune*, 28 Dec., 1850.
[165] "Tolls on the Illinois and Michigan Canal for the Year 1849," *Chicago Daily Tribune*, 27 April, 1850, 6.

higher tolls of 1849 as a "blunder," reporters praised the Board's decision to decrease the financial burden of merchants along the canal and in the city.[166] These actions, along with infrastructural improvements, made Chicago "second to no city in the West."[167]

Chicagoans owed the success of their fledgling city to its river and portages. The canal harnessed the commercial potential of these waterways to allow for efficient and easy transportation. Both Chicago and rural Illinois, however, relied upon the canal once it was completed in 1848. Through canal transportation and economic growth, the financial and environmental fortunes of town and country bonded. This was a relationship that neither rural, Illinois-River towns nor Chicago truly anticipated or understood. Chicagoans managed the I&M Canal, but merchants in towns including Summit, Lockport, Ottawa, and Peoria, owned the land along the canal banks. Chicago's supply of household goods remained tied to river tolls and shipping taxes. Rural suppliers, however, relied upon urban demands and political pressures to meet them. The I&M Canal was also an unexpected but convenient sewer system that satisfied the quick needs of a rapidly growing city. Urban sewage and wastes would soon become a rural problem. Commercial canal shipping and industrial growth produced an exchange not just in commodities, but in pollution. As cholera raged for another 4 years, Chicago's sanitation and public health crisis threatened the economic dominance of the city. These environmental exchanges proved not only dangerous, but necessary for further economic prosperity.

[166] Ibid., Illinois and Michigan Canal Commissioners, *Minutes of the Board of Trustees of the Illinois and Michigan Canal Commissioners*, "28 Dec., 1850" (Springfield, IL: State of Illinois Publishers, Illinois State Archives, 1850).
[167] "Annual Review of the Trade and Commerce of Chicago for the Year 1850," *Chicago Daily Tribune*, 1850, 1.

Chapter II: The Sanitation Challenge, 1848-1885

It seemed as if Ellis Chesbrough had saved Boston. In the 1840s, the young engineer and civil servant designed its first sewer system.[168] It employed iron pipelines to dispose of human wastes and ensure that potable water remained free of contamination. The concept of separating fresh water from wastewater for urban sanitation gained prominence during the mid-nineteenth century; Chesbrough's designs reflected its popularity. His accomplishment in Boston made Chesbrough a leader in the nation's civil service community; it identified him as a bold and innovative engineer. Impressed by Chesbrough's achievement, Chicago's Board of Sewerage Commissioners, a public agency charged with maintaining the city's sanitary services, offered him a position as their Chief Engineer. Chesbrough accepted the job and set about tackling one of the largest and most complicated public health and sanitation crises of nineteenth-century urban America.[169] Success in Boston hardly guaranteed success in Chicago.

In 1850, Chicago had established a cadre of sanitarians, professionals trained specifically to provide sanitary services, through its Boards of Sewerage and Water Commissioners. Problems presented by population growth, industrial development, and a swampy ecology, however, proved vexing. Chesbrough's talents, those on the Sewerage and Water Commissioners believed, would turn the tide of Chicago's ongoing battle with waste.[170] No amount of engineering expertise, however, could counter the desire for profit or the complexity of water as a multi-use resource. Chicago needed water to sustain its populace, provide transportation, and to

---

[168] Various Authors, *Biographical Sketches of the Leading Men of Chicago* (Chicago: Wilson and St. Claire, Publishers, 1868), 194.
[169] For historical studies of Chicago's growth and sanitation challenges see: William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton, and Co., 1991).; Harold Platt, *Shock Cities: The Environmental Transformation and Reform of Manchester and Chicago* (Chicago: University of Chicago Press, 2006).
[170] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal* (Chicago: City of Chicago Publishers, 1924), 30.

facilitate sewerage. Population growth meant that Chicago's engineers needed to both quench residents' thirst and wash away their refuse; the city's infrastructure was strained. With greater industrial development in the form of larger, more consolidated meatpacking plants and lumber mills, the amount of wastes dumped by those operations in the Chicago River increased. Cholera had also ravaged the city for two years, pressuring Chicago's public servants to find an answer. Accompanying this turbulent period in Chicago's history was an influx of European immigrants drawn to the promise of good jobs and a fresh start. Anti-immigrant sentiment, however, pervaded the ranks of the city's public health and sanitarian leadership. European immigrants, many of them Irish, moved to Chicago to work in one of its many industries, but lacked adequate sewerage to dispose of household refuse. Between 1850 and 1885, Chicago's sanitary crisis worsened, leaving its technocratic leaders with a false choice they believed unavoidable: either hold industry accountable for polluting the city's river, or sacrifice public health for continued economic growth. Sanitarians and engineers, led by Chesbrough, tried to defend both industry and improve public health. They failed in the latter endeavor. Rather than consider waste-dumping regulation, sanitary improvement strategies largely involved compounding Chicago's strained water distribution and sewage systems with "diversion," the historical term for reversal.

Chesbrough in Chicago

Without its primary polluters, many thousands of residents would not have a job, and the city's financial sector would collapse. Attempts to improve Chicago's sanitation and protect its citizenry from water-borne illness largely recognized yet avoided direct confrontation with the conditions underlying this conundrum. Instead, strategies to improve Chicago's sanitation infrastructure, which, by 1885, generally included drainage, sought to divert wastes while allowing dumping to continue unabated. Notions of personal accountability, particularly where

European immigrants were concerned, proved more important for many public health officials than the rapacious dumping of human and animal wastes into the city's primary sources of potable water. Chicago's sanitarians, politicians, engineers, and public health officials remained committed to building a drainage system that dealt with waste and that held profitable sources of pollution blameless.

The Illinois and Michigan Canal (I&M Canal) opened in 1848 and offered improved transportation to Chicago. With the arrival of new residents, grain, lumber, silica, coal, and many other rural commodities, the city's population increased and outpaced the improvements the city had made over the last five years. The cholera outbreak that began in 1849 caused an enormous panic in the city.[171] Waste water from privies in cramped working-class neighborhoods had seeped into the dirt and clay of Chicago's topsoil and into private wells, contributing to the rapid spread of the disease that inflicted thousands and killed over 1,000 people.[172] Burying of the dead still presented a problem as cemeteries failed to accommodate the new additions. In 1850, 420 people had died from the disease. The Chicago River's proximity to the city's industries, however, also made it a convenient dump. Human, animal, and industrial wastes, dumped in the river, flowed into the I&M Canal, making the artificial waterway an unintentional sewer. Spread through fecal matter, cholera infiltrated the city on ships traveling to Chicago on the canal and Lake Michigan. The prevalence of cholera in Chicago inspired many responses from residents, including home remedies that ranged from bloodletting to creams and oils.[173] Cholera also prompted the first significant municipal response to the city's sanitary conditions in the 1850s.

[171] "Epidemics," *The Encyclopedia of Chicago* (Chicago: The Chicago Historical Society, 2004).
[172] A.T. Andreas, *History of Chicago: From the Earliest Period to the Present Time*, (Chicago: A.T. Andreas, Publisher, 1884), 595-7.
[173] "Cholera" *The Chicago Daily Democrat*, 7 June, 1849.

As cholera spread, city officials focused their efforts on public health. According to historian Harold Platt, whether industries or residents "poured their pollution into the river or lake, the result was the same. The piped water was contaminated with organic wastes that made it unfit for human consumption."[174] Chicago's plans to address water-borne illnesses failed to contend with the convenience of dumping sewage in the city's slow-moving river. Chicago's rapid population rise also caught private entities and public agencies unprepared. Residents living near that waste disposal site, confronted not only disease, but noxious odors and poor water quality.

In 1851, the city of Chicago incorporated the Chicago Hydraulic Company. The Hydraulic Company's first task was to construct the city's first sewer system in the form of subterranean wooden pipes. According to historian William K. Beatty, this act represented an "important factor in reducing the death rate because it took the city one step closer to having a city-wide water system."[175] To administrate this project, the City Council established the Board of Water Commissioners and the Board of Sewerage Commissioners, effectively putting the Chicago Hydraulic Company out of business. With the dissolution of the Chicago Hydraulic Company, the City Council mounted the first public intervention in the city's sanitation crisis. This administrative move created a public response to river pollution.[176] It also solidified the response to Chicago's water quality through municipal agencies. Over the next three years, the new sewer system provided the city's first public attempt to address the dual problems of waste-removal and water-distribution. The initial water mains diverted wastewater away from Lake Michigan into holding tanks. Theoretically, residents could access potable water contained in

[174] Platt, *Shock Cities,* 209.
[175] William K. Beatty, "When Cholera Scourged Chicago," *Chicago History*, Vol. 11, 1., Spring, 1982, 8.
[176] "The City and the Sewage Commissioners," *The Chicago Times*, 17 April, 1856, 1.

these tanks. A problem emerged, however, when the primary mains did not reach every neighborhood equally. As the city expanded so rapidly beyond effective planning, the mains remained accessible only from neighborhoods near downtown. Human watercarriers often drew water, manually, from the lake. Holding tanks, however, also failed. Soft, porous, marshy soils allowed groundwater to contaminate the tanks, rendering potable supplies useless.

By 1851, another 216 people had died of cholera. Household waste-disposal practices largely remained unchanged since the incorporation of the Hydraulic Company. Sanitary officials had earlier established the ability to visit individual domiciles to help with cleanup efforts and many residents assumed this would also continue.[177] This practice declined once the city's population had exceeded 54,000 in 1850. Construction of the city's wooden pipelines also took time to complete; nearly two years. Although systematic efforts to address cholera represented how seriously the city's sanitarians regarded the crisis, a rapidly rising population and inconsistent sanitation practices meant that the disease had ample opportunity to spread.

1851 also brought the first national rail lines to Chicago, attracting even more capital, people, and waste to the city. Boat-slips located at the I&M Canal's terminus with the Chicago River's South Branch also strengthened the transportation connection between riverine and rail travel. The two transportation avenues complemented one another, at least at first. After the Galena and Chicago Union Railroad reached the city in 1836, many new lines emerged over the next decade. Chicago, however, lay amidst a landscape that was, in many ways, ideal for transportation. Flat land that lacked both rocks and forests offered potential for the construction of rail lines.[178] Rail proved even more attractive as many of the overland roads amidst the region's marshy landscape were seldom dry. The Galena and Chicago Union was, therefore, the

[177] Beatty, "When Cholera Scourged Chicago," 9.
[178] Cronon, *Nature's Metropolis*, 57.

foundation for a transportation explosion that helped spur tremendous economic growth in the city. Establishing its terminus at Canal and Kinzie streets where the North and South branches of the Chicago River converged, the Galena and Chicago Union Railroad established continuous access between the rail line and the I&M Canal.[179] Railroads quickly connected Chicago to wheat fields of northern Illinois and southern Wisconsin and later lines offered linkages with the Central and Southern Plains. Livestock haulers soon used trains to transport even larger numbers of livestock to the city. As the city's animal population rose so too did the lure of meatpacking.

Although the arrival of railroads surely brought curiosity and interest, along with the potential for economic growth, they exacerbated the city's sanitation crisis. Small stockyards brought travelers more as novel attractions than as sites of monetary exchange. As early as 1837, Willard F. Myrick had built a fenced-in yard near his boardinghouse on the city's South Side. Between 1840 and 1851, multiple smaller yards emerged in addition to Myrick's, including Bull's Head and Sherman Yards.[180] Each yard also had an associated saloon, hotel, and restaurant. Railroads reoriented these yards as cattle haulers could send their stock east. Space, however, emerged as a critical issue for new stock yards. As historian William Cronon notes in *Nature's Metropolis*, stockyards, although "initially located on prairie land just outside of the…city," they were "soon surrounded by houses and factories that limited their expansion."[181] Chicago's rapid growth also surprised its meatpackers. Cattle soon lost grazing land to this expansion and haulers had to buy grain from different merchants in separate parts of the city. This created immense foot and wagon traffic. Congestion in city streets endangered pedestrians

[179] John C. Hudson, "Railroads," *The Encyclopedia of Chicago* (Chicago: University of Chicago Press, 2004 by the Newberry Library), 676.
[180] Louise Carroll Wade, *Chicago's Pride: The Stockyards, Packingtown and Environs in the Nineteenth Century* (Urbana, IL: University of Illinois Press, 1986), 25-28.
[181] Cronon, *Nature's Metropolis*, 209.

and injured animals. Traffic, more importantly, broke up the Chicago market and made it difficult for buyers and sellers to compare prices offered by different packers.[182]

As meatpackers flocked to the city, offal and acids used to dissolve animal carcasses, colluded with biological wastes to contaminate the city's only sources of drinking water. An unbearable stench in the cramped working-class South Side neighborhoods remained an oppressive reminder of the city's deteriorating habitability. Chicago's relatively low elevation and poor drainage contributed to flooding and allowed refuse to drift.[183] Standing water, which degraded roads and made travel challenging, also lured disease-carrying insects to the river. The Chicago River and the conjoined I&M Canal, which brought the city prosperity, threatened its survival.

Civic and economic leaders attempted several strategies to clean streets and divert sewage. The City Council approved wooden planks as a quick solution, but they handled foot traffic poorly and merely absorbed steaming wastes. Thereafter, a variation of gravel and sand paved most of the city's streets until the turn of the century.[184] Improved bridges and drains attracted larger businesses to the city in addition to meatpackers. Tanneries, breweries, and brick mills soon established themselves near rail lines on the West and South Sides of Chicago. All had access to the I&M Canal. As the City Council worked to improve the city's strained infrastructure, residents placed greater trust in those elected officials and a technological elite to provide sanitation services.[185]

---

[182] Ibid.
[183] Platt, *Shock Cities*, 99.; Chicago's elevation above sea-level is 673 feet. Figure courtesy of: United States Geological Survey, "Elevations and Distances in the United States," egsc.usgs.gov, accessed: 6 March, 2015.
[184] A.T. Andreas, *History of Chicago: From the Earliest Period to the Present Time, Vol. I* (Chicago: A.T. Andreas, Publisher, 1884), 198-200. Readers interested in Andreas' work can find it in its entirety online.
[185] Ibid., 30.

Between 1852 and 1854, cholera claimed another 2,055 lives. In 1854, there were 1,424 deaths alone, which constituted 5.5% of the city's population.[186] The Hydraulic Company neared completion of the city's underground sewers in 1855 when only 147 people died. By 1856, the sewer system opened for operation and began accepting the city's wastes. The City Council also passed a measure calling for the licensing of scavengers, private individuals who contracted with the city to remove wastes from specific areas.[187] That year, cholera vanished. With the disease's departure, the City Council allowed the Chicago Board of Health to dissolve as it had after the first cholera epidemic of 1832 had abated.[188]

The Chicago River offered the city's largest waste receptacle, but many residents continued to deposit their refuse in the streets and on sidewalks. Civic and economic leaders attempted several strategies to clean the streets as described in A.T. Andreas' history of Chicago.[189] Engineers and sanitarians, including Ellis Sylvester Chesbrough, the Chief Engineer for the Chicago Board of Sewerage Commissioners and the architect of Boston's water distribution system, advocated draining roads into the Chicago River.[190] Born in Baltimore, Maryland in 1813, Chesbrough's origins were rather dissimilar from the high educational pedigree enjoyed by most "experts" and reformers. Chesbrough worked hard to promote himself and eventually garnered praise from the nation's leading reformists and their advocates. Contemporaneous accounts including the booster pamphlet *Biographical Sketches of Chicago's Leading Men*, illustrated the engineer's life and his contributions to engineering reform in Chicago and throughout the country. Born to a working-class but well-connected family tied to

[186] Beatty, "When Cholera Scourged Chicago," 10.
[187] Constance Bell Webb, *A History of Contagious Disease Care in Chicago Before the Great Fire* (Chicago: University of Chicago Press, 1940), 29.
[188] Beatty, "When Cholera Scourged Chicago," 4.
[189] Andreas, *History of Chicago*, 198. Readers interested in Andreas' work can find it in its entirety online, free of charge.
[190] Ibid., 200.

the burgeoning railroads of the Eastern Seaboard, Chesbrough sought a career in engineering, despite more limited educational opportunities.

In 1828, Chesbrough earned his first engineering credentials working under his father on the Baltimore and Ohio Railroad.[191] While working with railroads in Maryland, Ohio, Pennsylvania, New York, and New Jersey, Chesbrough garnered the attention of military engineers, including Colonel John H. S. Long, who recommended him for public works projects in Boston.[192] According to *Biographical Sketches,* Chesbrough's commitment to public service in Boston remained unparalleled, and he "cheerfully" set about work on the city's new sanitation and water distribution aqueducts.[193] Chesbrough not only designed Boston's first waste-removal infrastructure, but was instrumental in revolutionizing the city's engineering bureaucracy.

Between 1844 and 1846, as construction of the I&M Canal neared completion, Chesbrough rose to prominence as Boston's first Chief Engineer and established its first Board of Sewerage Commissioners. Chesbrough's work on the Boston sewer system, and recommendations from his colleagues, compelled the intrepid engineer to apply for the same position in Chicago. He arrived in 1855. Chesbrough set about toward working on Chicago's Board of Sewerage Commissioners. The plans that Chesbrough submitted were ambitious and drew skepticism from fellow engineers. His previous work in Boston, however, invited optimism that Chesbrough would be successful.

Submitting an impressive plan for an entirely new sewer system for Chicago, Chesbrough advanced discussions surrounding waste removal and water distribution. Chesbrough viewed urban infrastructures organically. Rather than attempting to secure clean water sources, he

[191] Anonymous. *Biographical Sketches of the Leading Men of Chicago*, (Chicago: 1867), 194.
[192] Ibid., 195.
[193] Ibid.

argued that Chicago required an infrastructure that would remove wastes and offer predictable, reliable systems to do so. Instead of examining wastes at the ground level, Chesbrough considered subterranean sewer systems, which he believed offered a more viable sewage-removal network. Drainage, elevation, and porous soils threatened this proposal. To transcend those obstacles, Chesbrough offered a more radical solution: raising the city ten feet. Rather than construct sewer pipelines amidst the swampy terrain of Chicago, Chesbrough sought to build his sewer system atop the swampy ground, while placing it beneath the city. His designs, although radical, drew considerable praise in Chicago, at least for their inventiveness. Elected officials, however, sought assurances that such a plan was not only possible, but would prove effective. Chesbrough's "exceedingly difficult proposal elicited much debate and considerable opposition within Chicago's Common (City) Council."[194] By 1856, however, Chesbrough not only found a new job in Chicago, but also saw his plans adopted by the city's Board of Sewerage Commissioners. Effective argument for his plan earned Chesbrough the backing of Chicago's chief public sanitation agency.

Chesbrough's leadership in the advancement of the city's sanitation infrastructure, marked a shift from privately-owned operations to those administrated by public entities. His engineering perspectives, which *Biographical Sketches* described as "stupendous strides," invited staunch opposition from "conservatives," aldermen who believed that Chesbrough's sewer system demanded too much money. Opponents "growled and railed about the taxes" incurred as proposed by Chesbrough's sanitation plans.[195] Chesbrough remained undeterred. Riding atop the successes he achieved in Boston, Chesbrough believed in the applicability of his methods and in public administration. The engineer contended that infrastructure would

[194] Ibid., 194.
[195] Ibid.

reconcile Chicago's false choice: allow industries to dump waste easily, while simultaneously keeping the city clean. Improved bridges and drains attracted larger businesses to the area including tanneries, breweries, brick mills, and meat-packing plants. Commercial development in Chicago increased the presence of private businesses in city leadership, which influenced how sanitation projects developed. Nonetheless, it was the transition from private organizations to the combined efforts of municipal entities that changed the administration of public works projects.

Historian Robin Einhorn studies nineteenth-century political economy in Chicago. In *Property Rules*, Einhorn contends that Chicago's political economy was neither corrupt nor democratic. Instead, political and economic power represented a "segmented" system wherein public officials rendered services based on special interests. According to Einhorn, by "keeping taxes low, budgets small, and decision-making power in private hands, [Chicagoans] denied aspiring 'bosses' access to public patronage."[196] Einhorn's assessment is mostly accurate. Public servants and municipal leaders had little concern for greater democratic influence on the city's political economy. Resistance to this system, however, was not as docile and easily placated as Einhorn suggests. Working-class Chicagoans did not so readily acquiesce to segmentation and private interests enshrined in public institutions. Residents expected results once those agencies achieved the political and economic means to do so. Improvements to city services did not produce a clean, consensual opposition to segmentation, either, as Einhorn suggests. Her focus on reform efforts, including roads, bridges, and sanitary systems, neglects to consider how much those improvements assisted Chicagoans suffering most from inconsistent or poor service. Residents placed greater trust in elected officials and a technological elite to make necessary improvements for economic expansion and clean neighborhoods. When living conditions

[196] Robin Einhorn, *Property Rules: Political Economy in Chicago, 1833-1872* (Chicago: University of Chicago Press, 1991), 19.

worsened citizens quickly blamed the same men. Cost of improved sanitation proved contentious.

By 1861, construction commenced on Chesbrough's sewer project. Extended debates and difficulty securing funding delayed the project. The ambition of his plan reflected in its complexity: to install the new system of iron pipelines, the city of Chicago required physical elevation of around ten feet near the central business district.[197] The cost was staggering. The city council debated extensively for nearly five years about funding requirements. A combination of public taxes and private bonds funded Chesbrough's sewer system. Although guided by a public agency, Chesbrough's project still required private financial assistance to complete.

Choosing Prosperity and Pollution

Chicago's need for Chesbrough's sewer emerged from the demand for effective waste-disposal near the city's growing slaughterhouses. Packing companies such as Swift and Armour deposited their wastes in the nearby Chicago River which fed Lake Michigan. Before the US Civil War, Cincinnati had claimed the title of "Porkopolis." In 1851, railroads had tied Chicago with the Great Plains to its west and south. Convenient rail connections, the I&M Canal, and access to Lake Michigan, meant that Chicago could process meat and effectively ship it to the eastern seaboard. The city's location and effective transportation proved financially lucrative. Industries, meatpacking included, consolidated their capital in Chicago, increasing the demand for regional labor. Burgeoning markets, centralized and effective in generating new profit, lured entrepreneurs and laborers. Meatpacking and agricultural workers also followed the new rail lines and the new slaughter companies. Various packers established their operations on the banks of the Chicago River, providing access to the I&M Canal and the city's new railroads. Although

[197] *Biographical Sketches of the Leading Men of Chicago*, 195.

most of the first packinghouses were self-contained, they required that hogs and cattle be transported over city streets from rail stations to the slaughterhouses.[198] This practice amassed wastes throughout the city, much of which washed into the Chicago River and inundated the new underground sewer system.

As large industries continued to dump their refuse into the Chicago River, municipal leaders quickly viewed the I&M Canal as a potential vehicle for waste-disposal.[199] Civic officials recognized Chicago's sanitary condition as dire and concluded that significant infrastructural changes proved necessary to address the problem. The slow-moving current from the Chicago River carried much of the city's refuse into the I&M Canal. Through the canal, the waste simply coagulated unless moved by torrential rains. Engineers working for Chicago's Board of Sewerage Commissioners determined that mechanical assistance was needed to force refuse through the canal and downstream. Although the Chicago River and Lake Michigan housed much of the refuse created by meat-packing plants and glue factories, surrounding areas constituted another urban sink.[200] The failure of early methods to resolve the problems of industrial pollution and citizens' living conditions made drainage a crucial issue.[201]

The Boards of Water and Sewerage Commissioners provided the earliest systematic response to Chicago's sanitary challenges, although they dealt with water distribution and refuse disposal respectively. This division often created inefficiency and miscommunication where infrastructural improvement was concerned. Many residents protested this inefficiency, but the

---

[198] Louise Carroll Wade, "Meatpacking," *The Encyclopedia of Chicago* (Chicago: University of Chicago Press, 2004, by the Newberry Library), 515.
[199] Andreas, *History of Chicago*, 30.
[200] Platt, *Shock Cities*, 135.
[201] The concept of a drainage canal, as stated here, occurred long before the construction of the Sanitary and Ship Canal. Throughout the nineteenth century, engineers working for the city of Chicago discussed the possibility of a "drainage" canal but did not directly reference the project that developed in 1890. Here, "drainage" is used to refer to a sanitary canal in concept, not a specific project.

city moved forward with plans to build its own water works, using the two separate organizations. Work began in 1853 on the water treatment and pumping works along the lakefront just north of downtown.[202] In 1854, the Boards commissioned two more works in downtown, separate from the sewage and water systems, which began service in 1874.[203] These complicated sewage treatment systems proved difficult to operate and required employees, working in shifts, to control it twelve hours a day.

The 1860s proved as troubling for Chicago's sanitation situation as the decade before. Chicago's population exploded during the ten-year period, rising to over 100,000.[204] Sanitation proved an even more staggering challenge. During the US Civil War, Union army contracts for processed pork and live cattle supported packinghouses on the Chicago River and the railroad stockyards that had emerged there in the 1850s.[205] To alleviate the problem of driving cattle and hogs through city streets, the leading packers and railroads helped incorporate the Union Stockyard and Transit Company in 1865. An innovative facility just south of the Chicago River provided access to the I&M Canal and railroads. This location also made it easier for packers to dump their waste in the river. While the city accumulated wealth from its lumber mills, foundries, and meatpacking plants, it also amassed sewage. Chicago's sanitation infrastructure proved inadequate.

Although public health officials and reformers had outlasted cholera, other waterborne diseases, particularly typhoid, remained. 1868 saw the formation of citizen activist organizations that addressed poor water quality and the threat it posed both to public health and economic

[202] Ibid., 30.
[203] Ibid., 31.
[204] Walter Nugent, "Demography: Chicago Becomes a Modern City," *The Encyclopedia of Chicago* (Chicago: University of Chicago Press, 2004, by the Newberry Library), 233.
[205] Wade, "Meatpacking," *The Encyclopedia of Chicago*, 515.

viability. Most of the activism that focused on the city's sanitation problems proved inconsistent and largely confined to letters and notices sent to aldermen serving on the city council. Newspapers proved the most effective in its criticism of the city's sanitation infrastructure and leadership. Regional media regularly published articles noting the contamination suffered in many of the city's working-class neighborhoods along with wastes deposited into Lake Michigan.[206] Local hospitals remained overrun by those afflicted with typhoid, and the regular dumping of sewage water in streets and on public sidewalks remained a nuisance that many communities found difficult to police. The enormity of Chicago's river pollution, however, proved difficult to quantify, and many within the city's leadership believed the problem minor enough to continue administering the city's sanitation as usual.[207]

The Great Chicago Fire: A Water Supply Disaster

Ellis Chesbrough had yet to solve Chicago's sanitation problem in 1871. He had endeavored to improve the city's failing sewer system quickly.[208] During the early 1870s, the Chicago River sink grew fouler and threatened public health more than ever before. Acids, chemicals, urine, and feces, gradually degraded the iron piping, creating leaks within the system which caused waste coagulation in residential water mains. Although the Great Chicago Fire of 1871 further revealed the limitations of the city's infrastructure, it presented an enormous, artificially created opportunity for new construction.

On 8 October, 1871, a large barn fire broke out on Chicago's Southwest Side. Massive wildfires south and west of Chicago had raged throughout the week, fueled by low relative

---

[206] "Lake Drainage," *Weekly Wisconsin Patriot*, 24 March, 1860, 2.; "Annual Statement of the Trade and Commerce of Milwaukee for the Year 1859," *Milwaukee Sentinel*, 24 January, 1860, 1.; "Bills Introduced: Drainage Fund," *Weekly Wisconsin Patriot*, 24 February, 1860, 4. Ann Keating has written extensively on the city's confrontation with various infectious, water-borne diseases. Cholera was not the only illness that Chicago found threatening to its economy and public health.
[207] Platt, *Shock Cities*, 32.
[208] Ibid.; "Anniversary of the Drainage Canal," *The Chicago Daily Tribune*, 3 August, 1895, 3.

humidity and a drought that carried over from the previous summer.[209] At 1062 South Jefferson street, just south and west of the central business district, the O'Leary homestead completely perished in a fire that started in their shed. Not unlike many Chicagoans of the era, the O'Leary's lived in proximity with animals. In addition to cows, the O'Learys likely had chickens, pigs, and other livestock on their small homestead. Both humans and animals contributed to the city's environmental concerns and Chicago's engineers struggled to dispose of human and animal wastes. Population density and tightly packed structures meant that a fire quickly affected many people and their property rapidly. In 1871, the city's population exceeded 300,000.[210]Although the actual cause remains unknown and many journalists falsely attributed the fire to the O'Leary's cow, a combination of warm south-west winds, dry air, and a confused fire watchman likely exacerbated one of the largest fires the country had seen.[211] The conflagration travelled rapidly northward engulfing the entirety of the Downtown central business district. According to historian Donald Miller, Chicago Fire Department firefighters believed that the Chicago River would provide a natural firebreak and prevent the conflagration from devastating the city's center.[212] This did not happen. Strong southerly winds that propelled the fire north, also sent it across the Chicago River South Branch toward downtown. The fire again jumped the Chicago River Main Branch and engulfed more affluent neighborhoods north of the central business district. The material products of Chicago's prosperity sowed the seeds of its destruction.

[209] "The Fire Fiend," *The Chicago Daily Tribune*, 8 October, 1871.
[210] Walter Nugent, "Demography: Chicago Becomes a Modern City," 233.
[211] Bessie Louise Pierce, *A History of Chicago: Volume III: The Rise of a Modern City, 1871-1893* (Chicago: The University of Chicago Press, 2007).; Donald Miller*, City of the Century: The Epic of Chicago and the Making of America* (New York: Simon and Schuster, 1996), 164. The false accusation of the O'Leary family and their bovine likely reflected the anti-immigrant and particularly anti-Catholic bias of the American media in 1871. Nonetheless, the O'Learys (and the cow) both received an official pardon from the Chicago City Council in 2015. See: "Mrs. O'Leary, Cow Cleared by City Council Committee," *The Chicago Daily Tribune*, 9 October, 2015.
[212] "The Origin of the Fire," *The Chicago Daily Tribune*, 10 October, 1871.

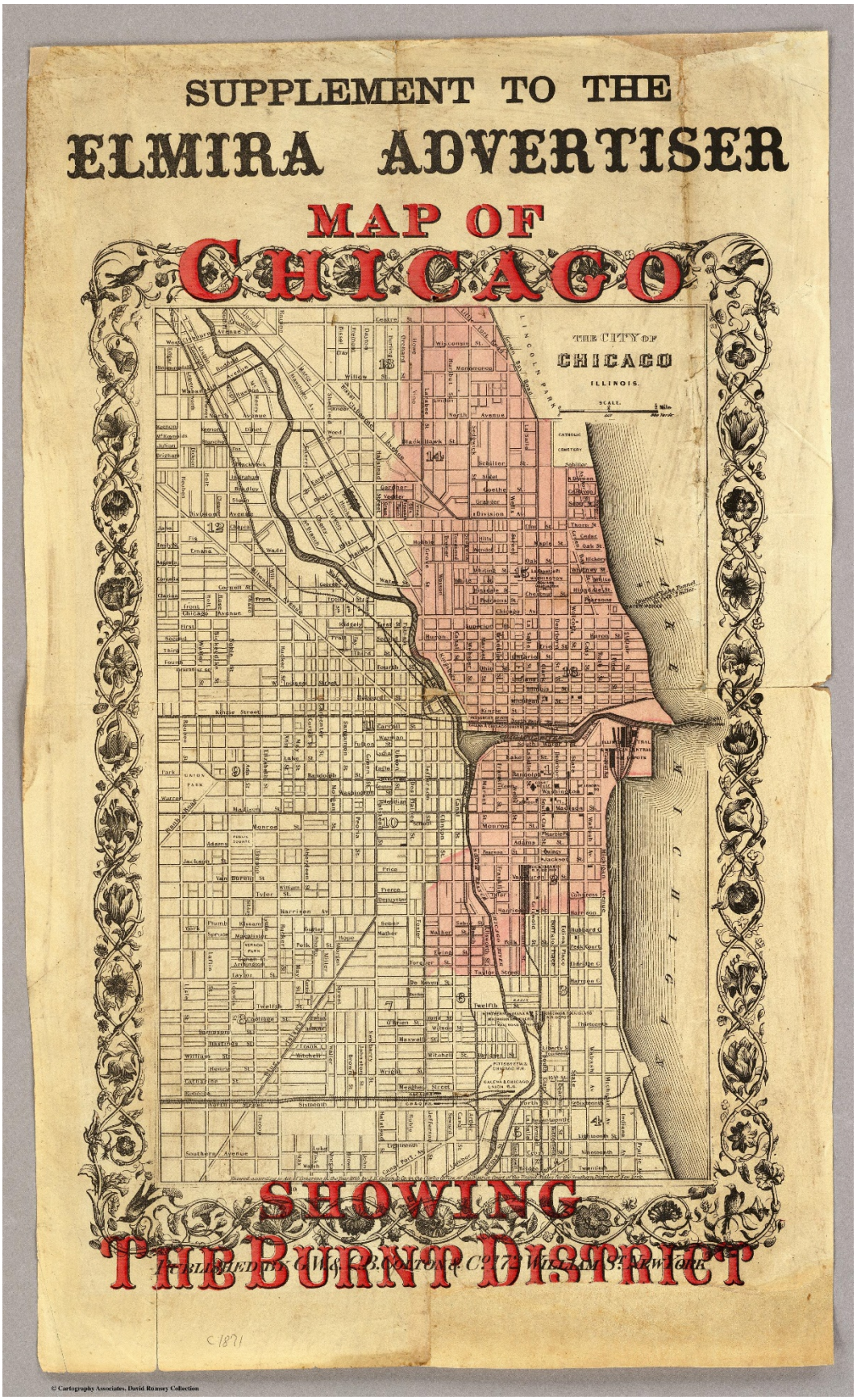

SUPPLEMENT TO THE
ELMIRA ADVERTISER
MAP OF
CHICAGO
THE CITY OF
CHICAGO
ILLINOIS.
SCALE.
SHOWING
THE BURNT DISTRICT
PUBLISHED BY G.W. & C.B. COLTON & CO. 172 WILLIAM ST. NEW YORK.
c 1871
© Cartography Associates, David Rumsey Collection

Figure 6: Elmira Advertiser, "Map of Chicago Showing the Burnt District" (New York: G.W. and C.B Colton and Co., 1871) David Rumsey Map Collection

Once the fires reached the coal and lumber yards, as well as highly flammable heating oils stored in the city's factories, the maelstrom of flame hopped the river and levelled the city. Firefighters struggled to contain the blaze as they could not access enough water. The city's primitive pumping works could not distribute water fast enough to put out a fire strengthened by fuel and fierce winds. Chesbrough's sewer also required a significant amount of water in reserve wells to function, further limiting the available water for firefighting. Tapping either the river or Lake Michigan represented only time-consuming options, and time was another resource in short supply. Once the fire finally dissipated on 10 October, over two-thirds of Chicago were a total loss.[213] At approximately $222 million in damages, the fire was one of the costliest disasters in US history by that date.[214] The Great Chicago Fire, as it was known in the ensuing decades, exposed the city's numerous infrastructural weaknesses, from poor building codes to an ineffective road system. Historian Christine Rosen, in her work *The Limits of Power*, described the fire as a "part of a general environmental crisis…caused by the rapid growth of cities in this period."[215] Most significantly, the fire displayed the flaws of Chicago's water distribution system. Not only was the city completely unable to dispose of its sewage properly, but it struggled to defend its mostly wooden structures from fires.

The conflagration also left nearly 100,000 residents homeless in every sector of the city, intensifying concerns about the spread of infectious diseases.[216] Chicago's rapidly increasing population and the public housing crisis that the fire created brought a commensurate rise in the

[213] Ibid.
[214] Miller, *City of the Century*, 164. See also: Jennifer Koslow, "Public Health," *The Encyclopedia of Chicago* (Chicago: The Chicago Historical Society, 2010).
[215] Christine Rosen, *The Limits of Power: Great Fires and the Process of City Growth in America* (Berkeley, CA: University of California Press, 1986), 4.
[216] Koslow, "Public Health," *The Encyclopedia of Chicago*.

production of human and animal wastes, although industrial refuse remained the city's primary polluter. Given that Chicago struggled to distribute the water necessary to quickly extinguish the fire, the large number of unhoused persons and drainage proved ominous. Rosen explains that "massive population and economic growth necessitated the redevelopment and adaptation of every aspect of the urban environment to meet the changing needs of urban dwellers."[217] The fire not only provided for that opportunity, but its rapid growth demanded it. Defense of commercial growth often came at the expense of defending residents. In addition to concerns about the disposal of the city's waste, many Chicagoans continued to fear the rise in the immigrant population, already viewed as harbingers of sanitary crisis.[218] The pumping works used in the sewer system often released sediment and lake life into neighborhood wells, which flowed into bathtubs and kitchen sinks.[219]

Nonetheless, the concern over a rising population and the inability to meet the demands of the citizenry, the fire presented Chicago with an enormous opportunity. Not only was there a significant amount of open land, prepared for development, but engineers and sanitarians alike found the political pressure needed to agitate for technological and infrastructural improvements. The Great Chicago Fire represented a chance to not only rebuild the city in the image of progress and civil service, but to forge a position of leadership within the engineering community. Rosen argues that the fire also represented a situation where power was hotly contested. Power, for Rosen, is a secondary issue; she is interested more in "determining which individuals or groups wield power and which do not."[220] This framing is appropriate. Chicago possessed a chance to not only rise from the ashes, but seize control of the region permanently. Achieving this victory,

[217] Rosen, *The Limits of Power*, 4.
[218] "The Origin of the Fire," *The Chicago Daily Tribune*, 10 October, 1871.
[219] Harold Platt, *Shock Cities*, 140.
[220] Rosen, *The Limits of Power*, 6-7.

however, required a sober examination of the city's failures and the viable solutions that existed. Chesbrough also saw the opportunity and knew that he had the chance to complete yet another engineering feat: help orchestrate Chicago's resurrection. That task was as massive as it was difficult. City leaders and engineers alike debated the entire construction of their city and its infrastructure.

Space, as Rosen documents, remained an important issue for providing living conditions that met the needs of residents. Population growth "necessitated the continual specialization of building design and the repeated renovation of existing buildings to accommodate changing land use patterns."[221] Although Chicago adapted its building practices, cramped conditions pervaded the city before and after the fire. Confined neighborhoods posed a persistent problem and perpetuated the city's sanitation crisis. Confrontation with the source of both financial and demographic growth remained undesirable. As Rosen concludes, that in "environmental development, as in social development, the exercise of power involved far more than the spending of money and the overt use of legal authority and political force." She suggests that instead, "power in nineteenth and early twentieth century cities was simultaneously more complexly distributed and more wide-spread than either the pluralist or elitist theories traditionally would have it," that "technological problems, budgetary limits, the scarcity of centrally located space, the fact that many improvement goals were thus mutually exclusive…limited what people could do to adapt the environment to their needs."[222] Addressing a polluted landscape meant confronting a system that made Chicago economically vibrant, while contaminating its drinking water. Chesbrough anticipated, though, the discussion quickly shifted to the foul Chicago River and the waste that threatened Lake Michigan.

[221] Ibid., 13.
[222] Ibid., 335.

Over the following decade, engineers and city residents questioned the technology used to distribute lake water, particularly since the Chicago Fire Department experienced great difficulty in harnessing to battle the blaze of 1871. Additionally, sewage continued to coagulate in the overmatched sewer system, much to Chesbrough's horror.[223] As Chicago's sanitation worsened, Chesbrough advised the Board of Sewerage Commissioners to consider larger projects that targeted the flow of water in and out of the city. Furthermore, Chesbrough urged his fellow engineers in the Civil Engineers Club of the Northwest to consider the threat of flooding in the city.[224] Chicago's flat, marshy surroundings, particularly near the confluence of the Des Plaines River and the portages, remained susceptible to flooding. The riverine ecosystem that solidified Chicago's rise, also threatened to lift its refuse into streets and living rooms. Drainage, unfortunately, remained a terribly expensive enterprise, and the Civil Engineers Club knew that the city's Drainage Commissioners board and the City Council would negate any project that exceeded Chicago's tight budget, especially amid its reconstruction.[225] Chesbrough and his compatriots continued to debate alternatives.

The concept of diversion emerged during these discussions, although many engineers, Chesbrough included, doubted their effectiveness. Diversion dominated discussions about improving Chicago's sewerage infrastructure. During these planning meetings, Chesbrough promoted a larger and deeper drainage channel to divert the city's contaminated water.[226] Ultimately, the expense that this option presented the Boards of Sewerage and Water Commissioners made the prospect of building a separate drainage canal undesirable. Both public

[223] Ellis Chesbrough, *Minutes and Proceedings of the Civil Engineers Club of the Northwest*, "Report of the Committee on Drainage" (Chicago: The Civil Engineers Club of the Northwest, 1 July, 1878), 90.
[224] Ibid., 92.
[225] Ibid., 93.
[226] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 50.

agencies devised several alternatives to carry polluted water out of the city without adopting this plan.

Engineer G.D. Ansley, presented a paper at a meeting of the Civil Engineers of the Northwest, advocated "natural drainage." Invoking the city's settler past, Ansley referenced the ways in which explorers' camps developed along the Des Plaines River and portages. Ansley explained that in "the wilderness," surveyors would pitch camp "even for a few days" and "select some spot where the waste water will flow away from him."[227] Montreal also used a similar system of natural drainage, whereby domestic development used the topography of the city's surroundings to assist in housing sewage and drainage. Ansley, therefore, recommended that Chicago rebuild its residential sections similarly. The construction costs for this type of development remained inexpensive. According to Ansley, the Illinois State Board of Health also supported this drainage plan and suggested that enhancing the current of the Chicago River, while also employing the existing I&M Canal, would adequately dilute the city's sewage.[228]

Ansley's comparison between Montreal and Chicago seemed appropriate. According to his paper, Ansley explained the difficulties in draining the French-Canadian city, and how much of the city's sewage remained stagnant in holding canals near its central financial district.[229] Furthermore, Montreal also possessed a "small, slow-moving stream," similar ecologically to the Chicago River, that flowed into the St. Lawrence River and often carried much of the city's waste into major commercial waterways.[230] The river and the sewage treatment ditch created a "stagnant ditch" near the city that represented an open sewer rather than a navigable river or

[227] G.D. Ansley, *Minutes and Proceedings of the Society of Civil Engineers*, "City Drainage," (Chicago: American Society of Civil Engineers, Paper delivered on 1 April, 1879), 100.
[228] Ibid.
[229] Ibid., 101.
[230] Ibid.

source of potable water. Ansley also illustrated the ways that Montreal's sewage challenges also obstructed the city's access to commercial shipping, thus effecting economic progress. Montreal's residency, also utilizing wooden sewers, drains, and roads, often disposed of human and animal wastes into the streets. Ansley documented how Montreal's municipal leadership then built brick tunnels and sewer lines that carried sewage, using the city's elevation, toward the river and other associated waterways. Although Montreal still faced sanitation challenges, Ansley noted that its situation showed how a city could adapt to its surroundings rather than completely alter it in ways that wasted both resources and money. Conservation of a city's assets, for Ansley, remained a high priority.

This discussion reveals not only the magnitude of urban sanitation problems in the late-nineteenth century, but also that Chicago's leaders considered a variety of solutions and sanitary perspectives. The city's sanitary crisis and riverine sewage were not exceptional. What made the city's situation particularly difficult was the rapid pace at which Chicago's population expanded. Political opposition to any expensive engineering project also provided an obstacle for those tasked with creating a solution to a problem that threatened to unsettle the city's economic dominance. Chicago's geography and ecology, although similar to cities including Montreal, meant that few places existed for sewage disposal. Either they flowed through the Chicago River, or into the city's failing sewer system.[231] Further complicating matters, the river's trajectory toward Lake Michigan made the issue of drainage particularly important for the city's ability to effectively distribute water and dispose of refuse.

As the city's leadership contended with the opportunity to rebuild Chicago and bolster its defenses against future conflagrations, another cholera epidemic, along with bursts of typhoid,

[231] "Sanitary Matters: The Weekly Conversation of the State Board of Health ---199 Deaths in the Past Week," *The Chicago Daily Tribune*, 2 October, 1872.

emerged in 1872 and 1873. Ben C. Miller, Sanitary Superintendent for the Cook County Board of Health, issued a report to the US Supervising Surgeon's Office concerning the scale of the outbreak and its ramifications.[232] Miller remarked of the United States more generally that "where good water, perfect drainage, and a strict observance of sanitary laws were observed (throughout the country), the disease was to a certain extent, controllable."[233] In Chicago, however, those conditions were non-existent. The 1872 outbreak struck the city's fifth ward, near the industrial meatpacking plants just south of thirty-seventh street and west of State street. Miller reported that the entire neighborhood suffered from poor drainage and that its low, flat plain allowed for the accumulation of household wastes in pools along and near heavily travelled roadways.[234] The *Chicago Daily Tribune* reported that "Chicago's stables were the worst in the world for the disease." According the paper, "Chicago has at present the most horses and cattle than any other city in the world in population and less accommodation for them."[235] Sewage coagulated some "5 to 15 feet in depth," and contaminated public wells and hydrants used throughout the neighborhood.[236] Fifteen deaths were reported in the Packingtown neighborhood, then called the Town of Lake, as carbolic acid rendered all drinking water in the area unsafe for consumption. In addition to cholera, Miller reported that typhoid fever also claimed some eight lives to the north and east of Lake. Carbolic acid spread the disease, which contaminated public wells drains, and streets.[237] In association with Dr. John H. Rauch of the Illinois State Board of Health, Miller conducted several studies of the city's sanitation infrastructure and ordered new

[232] John M. Woodworth, M.D., U.S. Supervising Surgeon, Merchant-Marine Hospital, *Cholera Epidemic in the United States*, "Cook County: Report on the Cholera Epidemic of Chicago and Vicinity During the Summer of 1873," issued by Ben C. Miller, M.D. (Washington: Government Printing Office, 1875).
[233] Ibid., 214.
[234] Ibid.
[235] "Look to Your Horses: The 'Canada Disease Undoubtedly in Chicago," *Chicago Daily Tribune*, 24 October, 1872, 8.
[236] Woodworth, M.D., *Cholera Epidemic in the United States*, 215.
[237] Ibid., 216.

surveys of Chicago's public wells and water pumps. Waste flowing through the Chicago River became lodged in the containment cribs along Lake Michigan's shoreline near downtown, further threatening the city's water supply.

Miller and Rauch "visited every home of the inflicted" in Lake, noting the "sanitation habits of the village."[238] Miller was thorough in illustrating the cleanliness of each home and who lived there, particularly if the dwelling housed immigrant families. In Lake, Miller noted that most of the residents were of German and Danish descent. Concluding that those who "followed sanitation law, attended to the disinfection of excreta, and were prompt in calling a physician," often survived. Those who disobeyed common medical and sanitary precautions often fell victim to the epidemic.[239] For Miller and Rauch, there was a direct connection between those who observed and adhered to the sanitary conventions of the city's public health authorities and immigrant status. Those who assimilated to these standards, the expectations of cleanliness were observed as having spared themselves of the epidemic and of achieving proper citizenship. According to Miller's report, "proper sanitation" and "personal cleanliness" often determined how a person either avoided the disease or dealt with it upon contraction.[240]

Once the epidemiological data was compiled by the Board of Sewerage Commissioners and the Illinois State Board of Health, Miller concluded that drainage and the protection of Chicago's water supply remained the primary factors in protecting the city's populace from future outbreaks.[241] Typhoid continued to ravage parts of the city still laid bare from the Great Fire, but also claimed victims in sections of the city still struggling to provide residents with

[238] "Chicago's Health: Weekly and Monthly Reports of the Sanitary Superintendent," *Chicago Daily Tribune*, 5 June, 1872, 217.
[239] Woodworth, M.D., *Cholera Epidemic in the United States*, 216.
[240] Ibid., 218.
[241] "Chicago's Health: The City's Sanitary Condition in the Past Week," *Chicago Daily Tribune*, 17 January, 1872, 4.

adequate sanitation.[242] Reporters at the *Chicago Daily Tribune* noted the connection between water quality and the spread of cholera and typhoid. Emergency vaccinations, provided by the State Board of Health, later helped diminish the spread of both diseases.[243] Citing ongoing problems with drainage in many of the city's South-Side meatpacking neighborhoods, the *Tribune* writer proclaimed that "an abundance of pure air, pure water, and general cleanliness of all premises inhabited by human beings, are absolutely essential to good health…the city has yet to provide them."[244] Both the local news media, and state medical professionals saw a link between not only the improvement of infrastructure, but the adherence to universal standards of cleanliness.[245] Miller noted how many residents battling cholera and typhoid were "filthy in their persons; whose families were crowded into a small room reeking with filth."[246] For many medical and public health experts, personal responsibility remained essential to curtailing the effects of epidemic disease in Chicago. Industrial waste dumping, however, continued throughout the next decade.[247]

The spread of epidemic diseases, most of them water-borne, created an intensified urgency within Chicago's sanitarian and engineering communities. Both the Boards of Sewerage Commissioners and Water Commissioners initiated calls for more expansive solutions to the city's sanitary crisis. The plan that invited the most discussion was the construction of a "deep cut" or drainage canal that would assist in the dilution or removal of wastes from the Chicago

[242] "Sanitary Matters: The Weekly Conversation of the State Board of Health ---199 Deaths in the Past Week," *The Chicago Daily Tribune*, 1872.
[243] "Chicago's Health: The Weekly and Monthly Reports of the Sanitary Superintendent—A General Decrease in Disease, and Improvement in the City's Sanitary Condition," *The Chicago Daily Tribune*, 5 June, 1872, 5.
[244] "Cleanliness and Health," *The Chicago Daily Tribune*, 9 November, 1879.
[245] *Cholera Epidemic in the United States*, "Cook County: Report on the Cholera Epidemic of Chicago and Vicinity During the Summer of 1873," issued by Ben C. Miller, M.D., 219.
[246] Ibid.
[247] "The Chicago Drainage Problem," *The Chicago Daily Tribune*, 28 December, 1879.

River.[248] Dr. Rauch of the Illinois State Board of Health attended meetings of States and municipalities located within the Mississippi River Valley to discuss the issue of drainage from Chicago. The Sanitary Council of the Mississippi Valley, of which Rauch became a member, adopted a system of water-quality analysis, particularly for the prevention of water-borne illnesses, in response to the increasing problems experienced in Chicago.[249] Working with his state offices in Springfield, Rauch established stronger national public health connections in Chicago to improve both sanitation infrastructure, including domestic water drainage, and medical treatment of water-borne illnesses.[250] The founding of the Sanitary Council of the Mississippi River Valley revealed the national attention Chicago garnered after its confrontations with cholera and typhoid during the 1870s. Although the region had dealt with Chicago's sanitary woes since the Blackhawk War of the 1830s, national public health organizations found necessary their intervention in the city's sanitation.[251] As conversations surrounding drainage developed within Chicago's engineering community, national cooperation strengthened.

The Civil Engineers Club of the Northwest was one such organization that confronted the issue of drainage. Ellis Chesbrough quickly rose through the ranks of the club, contributing his support of sewage drainage from the Chicago River and its associated open sewer, the Ogden ditch. Chesbrough recognized the urgency of the debates taking place within professional engineering organizations, particularly the Civil Engineers' Club of the Northwest. As residents became increasingly concerned with Chicago's sanitary condition, merchants, community

[248] Ibid.
[249] *Sanitary Council of the Mississippi Valley*, "Inaugural Report" (Hamilton, OH: Democrat Job Rooms Print, 1882), 4.
[250] Ibid., 9.
[251] *Sanitary Council of the Mississippi Valley*, "Address of the Committee on General Sanitation" (Hamilton, OH: Democrat Job Rooms Print, 1883), 27.; Lemuel Bryant, "Travel Journal," (Chicago: Chicago Historical Society, July, 1832), Ann Durkin Keating, "Cholera," *The Encyclopedia of Chicago*, (Chicago: The Newberry Library, 2004).

organizers, and workers forged collective responses to the alarming waste near their homes. The stench emanating from the Chicago River served as a continuous reminder of the peril facing the public's health and the city's financial viability. In 1874, concerned Chicagoans formed the Citizens' Association of Chicago (CAC) to provide coordinated public response to issues concerning life in the city. Although sanitation and infrastructure remained atop the association's list of grievances, public safety, taxation, election fraud, and health associated with what they saw as products of the Chicago River's pollution, also influenced many of the organizers' public statements. Most of the CAC's Board of Directors and its organizing Central Committee were people who possessed long careers in the city's economic and political leadership.[252] The CAC Central Committee elected Franklin McVeagh its new president who vowed to not only improve the city's public services, but to also reform municipal tax policies. This new level of residential organization reflected the heightened awareness of the threat facing Chicago as it hurtled toward its re-emergence.

The CAC offered working people a platform to discuss their public health concerns.[253] Through this organization, public demonstrations, and town hall meetings, residents pressured authorities, thus hastening the response to water and air quality in industrial neighborhoods. Despite the diversity of the CAC membership, those who funded the organization often found the most thorough representation on the Board of Directors and the Central Committee. Rather quickly, however, the Board of Directors drove many of the discussions and activities adopted by

[252] "Citizens Association: Meeting of the Committee of One-Hundred," *The Chicago Daily Tribune*, 12 September, 1874.
[253] The Citizens' Association of Chicago, *The Annual Report of the Citizens' Association of Chicago*, "Reports and Addresses" (Chicago: Hazlett and Reed, Printers and Publishers, 1874-1876), 12. Printed copies of these documents are bound and held in the Municipal Records collection of the Government Information division at the Harold Washington Library Center in Chicago, Illinois. The archive possesses a complete collection of the Citizens' Association reports. Original copies can be accessed at the Newberry Library's Special Collections in Chicago, Illinois. This dissertation will use the abbreviation "CAC" when referencing the Citizens' Association of Chicago.

the CAC. The wealthy and connected bankers and real estate developers levied immense influence on the entire organization. CAC Board of Directors president, Murry Nelson petitioned the city to "improve cleanliness and eradicate offensive smells." The Board of Directors annual reports and meetings often launched bristling, florid attacks against the city's political and engineering leadership. Nelson noted the "self-sacrificing zeal" of the CAC's activists, who "turned out night after night during the winter months to trace the location and origin of the nuisance."[254] The largely ineffective efforts of Chicago's sanitarians, which Nelson described as "great embarrassments," provided the Association president with an arsenal of political ammunition. Nelson continued his barrage stating that sanitation solutions constituted a "recklessness, born of impunity" which allowed the "terrible scourge" that affected the city's "southern and western sections and rendered residence...almost intolerable."[255] The ecological damage wrought by meatpacking plants and glue factories constituted an environmental and social quandary.

Historian Melanie Kiechle examines the history of odors in nineteenth-century urban America. In *Smell Detectives*, Kiechle, who describes her work as a "sensory history," contends that smells have a history and that they often influenced how Americans thought about the quality of their built environs.[256] Chicago's urban-environmental history comprises a significant portion of Kiechle's analysis. Arguing that Chicagoans viewed "protecting health" as "improving the smell of the city," Kiechle shows how vital improving the olfactory quality of Chicago was for many residents concerned about sanitation.[257] City residents confronted an immense sewage

[254] *The Annual Report of the Citizens' Association of Chicago*, 13.
[255] Ibid.
[256] Melanie Kiechle, *Smell Detectives: An Olfactory History of Nineteenth-Century Urban America* (Seattle: University of Washington Press, 2017), 7.
[257] Ibid., 5.

problem produced by a meat packing industry that employed thousands of workers. Neighborhood activists even drafted a petition that collected thousands of signatures. The CAC supported that petition and brought it before the City Council in hopes of "bringing swift attention to the scourge near the river."[258] Chicagoans, at least those in affluent neighborhoods with time to contemplate the issue, saw how the same riverine ecology that supported Chicago's mighty industrial capacity threatened its citizens' health and economic survival. Working-class residents had neither the time nor the choice to contemplate foul odors, they experienced them every day.

Nelson's secretary in the CAC was John C. Ambler, a fellow banker, and one of the most stalwart activists within the organization. Born in Ogdensburg, New York in 1827, Ambler rose within the banking and financial industry in both New York and then Milwaukee, establishing for himself a regional presence.[259] Ambler moved to Chicago first in 1856, returned to Milwaukee, and then came back to Chicago in 1869, where he resided throughout his tenure with the CAC. Upon the CAC's founding in 1874, Ambler's commitment to the struggle against social and environmental "disease" was a welcome force within the city's political arena.

Chicago's engineering cohort, including Chesbrough and his compatriots within the Civil Engineers' Club of the Northwest, found difficulty in navigating the waters of bureaucratic red tape and personal intrigue that continued to plague the city's leadership.[260] Many politicians, industrialists, and engineers were unwilling to confront the uncomfortable truths surrounding Chicago's sanitation crisis. Particularly important was the hard truth that the problem of water and air quality remained linked to the unregulated dumping of industrial sewage into the city's

[258] The Citizens' Association of Chicago, "Smells" *The Annual Report of the Citizens' Association of Chicago* (Chicago: Hazlett and Reed Publishers, 1878), 28.; Kiechle, *Smell Detectives*, 4.
[259] The Citizens' Association of Chicago, "J.C. Ambler" (Chicago: Hazlett and Reed Publishers, 1900), 1.
[260] *The Annual Report of the Citizens' Association of Chicago*, 14.

primary water sources. Nelson advocated a close working relationship between residents, merchants, and aldermen to address Chicago's sanitation. Between 1877 and 1879, the CAC organized a movement for reforms within the city's electoral process, urging Chicago's Election Board to contribute more funds to the oversight of elections.[261]

According to Nelson, the election of "honest, good men," remained "essential" to sanitation reform efforts.[262] Chicago's incumbent Health Officer drew a significant amount of Nelson's agitation, retaining the moniker of "incompetent, dishonest, and disloyal."[263] The state of the city's air quality, directly connected to the Chicago River and the Ogden Ditch open sewer used to supplement the waste it carried, also attracted much of the CAC's attention. Nelson believed that the city failed in its funding appropriation to air quality, stating that "disagreeable and noxious odors that pervade our city were the subject of a minute examination by a large committee formed for that purpose under the auspices of the Health Officer."[264] Assuming the actual representation of many of Chicago's merchant class, Nelson concluded his remarks by casting further doubt on the legitimacy of the city's political representation. Political leaders, according to Nelson, Ambler, and other CAC leaders, provided inadequate service to their constituents and that instead their work constituted only a "sentiment" and was more accurately a "falsity."[265] Nonetheless, Nelson extolled the virtues of the electoral process, pleading with the CAC membership, and neighborhood residents to cast their ballots for new leadership. Nelson proclaimed that "the neglect of any voter to cast his ballot at the ensuing election is a crime."[266]

---

[261] The Citizens' Association of Chicago, *The Annual Report of the Citizens' Association of Chicago,* "Smells," 28. In each annual report, the CAC divided its annual reports into sub-sections that dealt with a different issue confronting the city. This dissertation with cite each entry separately, as they often dealt with topics in a piecemeal manner. Each citation that follows from an entry will share the publication data of the original citation.
[262] Ibid., 12.
[263] Ibid.
[264] Ibid.
[265] *Annual Report of the Citizens' Association of Chicago*, "Sewerage," 13.
[266] Ibid.

Fair elections, according to Nelson should eliminate any "fear" of "bad or incompetent men retaining office." The progress of Chicago's sanitation reform hinged upon supportive political leaders willing to challenge the entrenched bureaucracy.

Election reform aided in the restructuring of the city's bureaucracy enough to move forward on a discussion to improve Chicago's sanitation infrastructure. The CAC noted, however, that any new method selected by the city's sanitation engineers would have to accommodate the continued dumping of industrial waste in the Chicago River. Nelson acknowledged not only the lack of regulation from city leadership, but the lack of political will within the city's merchant communities to challenge the businesses who represented the greatest pollution offenders. Furthermore, the CAC, through Nelson's public statements also recognized the importance to labor the success of the city's largest industries represented. Not only did industrial meatpacking, lumber, brick manufacturing, and fertilizer production generate enormous financial capital for the city, they employed its residents. Characterizing the lack of regulation as a "great embarrassment," Nelson stated that the city could not "succeed without jeopardizing a very important commercial interest, the source of large profits, to a numerous business constituency, and of employment to a much greater number of industrious workmen."[267] Nelson believed that the "introduction of proper apparatus will, if carefully attended to its operation, effectually stop the odors from the rendering and fertilizing works, and those who contumaciously refuse to adopt some of the plans presented to them…"[268] Infrastructure, therefore, represented the best hope for Chicago's public health. Despite their best efforts, however, the city's engineers struggled to find a viable solution.

[267] The Citizens' Association of Chicago, *Annual Report of the Citizens' Association of Chicago*, "Smells" (Chicago: Hazlett and Reed Publishers, October, 1879), 6.
[268] Ibid., 7.

The CAC concluded that the foundation of new sanitation infrastructure was of the utmost importance and that it would "occupy our (the CAC) attention for some time."[269] Much to the dismay of the CAC leadership, "no viable plan existed" for Chicago River problem.[270] Nonetheless, Ambler motioned during an annual meeting, that the CAC pressure the city to appropriate funding and personnel to the issue of drainage. New CAC president, Edson Keith, who replaced Nelson in 1880 once his term concluded, concurred. Keith stated that a "proper system of drainage would remedy both these evils- it would purify both the river and the sewer."[271] Through their political activism and communication with both city leaders and engineers, the CAC moved toward a concrete solution upon which they could further galvanize support for the improvement of Chicago's sanitation.

Drainage emerged as the most vexing, yet attractive concept facing the city's sanitarians, business leaders, and political activists.[272] Along Fullerton Avenue, near the Chicago River's North Branch, the city installed new drainage pumps to help facilitate greater flow of water through the river. The logic informing the construction of the new North Side wells was to enhance the river's current both along the North Branch, also heavily polluted, as well as through much of the main branch in the Central Financial District.[273] The pumps would send 21,000 cubic feet of water per second (cfs) through the North Branch, increasing the overall flow of the river to 25,000 cfs through the Main Branch and through the South Branch. Dr. Rauch of the Illinois State Board of Health informed the of the new pumping system in cooperation with the Boards of Sewerage and Water Commissioners.[274]

---

[269] *Annual Report of the Citizens' Association of Chicago*, "Sewerage," 10.
[270] Ibid.
[271] *Annual Report of the Citizens' Association of Chicago*, "Main Drainage," 17.
[272] "The Chicago Drainage Problem," *The Chicago Daily Tribune*, 28 December, 1879.
[273] Ibid.
[274] "Chicago Drainage: Another Meeting of the Citizens' Association Committee," *The Chicago Daily Tribune*, 27 February, 1880.

Chicago's drainage concerns also drew the attention of national sanitarians. Dr. Rauch's work with the Mississippi Valley Sanitary Council involved drainage negotiations with states along the Mississippi River. Many representatives on the Sanitary Council considered dramatic increases in Mississippi water levels from drainage pumps in Chicago.[275] Rauch urged all members of the Sanitary Council, at a general meeting in Memphis, Tennessee, to advocate for greater public education regarding sanitation. According to Rauch, sanitation "begins in the home," and that Chicago's efforts to address pollution in its water sources, must work in tandem with downstream endeavors to combat infectious diseases.[276] The connections Rauch made between coordinated, national responses to water-borne illnesses, and the affirmation of a clean citizenship at home, signaled the solidification of nationalism through sanitation.[277] Rauch's recognition of personal and national engagement with cleanliness also shifted the emphasis on the source of pollution. In "directing and promoting general sanitation, in enforcing health regulations, in increasing and diffusing public knowledge of hygienic observances, and in attracting public attention to these subjects, the work of the council with be fraught with benefit to the community."[278] Public awareness, in addition to infrastructural improvement, provided the most effective response to Chicago's sanitation crisis. Rauch continued by stating that the Sanitary Council conduct "individual assessments" of private households, to ensure that residential domiciles in the Mississippi River Valley be "placed in the best possible sanitary condition."[279] At no point, did Rauch, or any of the other sanitary professionals recommend the regulation of industrial dumping in the Chicago River.

---

[275] Dr. John H. Rauch, *Proceedings of the Sanitary Council of the Mississippi Valley*, "Address of May 24, 1879" (Chicago: City of Chicago Publishers, 1879), 4.
[276] Ibid., 5.
[277] See: Suellen Hoy*, Chasing Dirt: The American Pursuit of Cleanliness* (New York: Oxford University Press, 1996).
[278] Rauch, *The Sanitary Council of the Mississippi Valley*, 4.
[279] Ibid.

Chicago's environmental contradiction, the pollution of its water sources by the industries that made the city prosperous, coincided with rapid population growth. The public health reports issued by Dr. Miller and Dr. Rauch, revealed the ways in which sanitary and medical professionals viewed not only disease epidemics, but also those most susceptible to them. Inadequate housing or medical care access did not, according to Chicago's healthcare experts, contribute to the spread of infectious diseases. Instead, it was the ways in which immigrant communities practiced their own hygiene. Personal responsibility, through these conversations, emerged as a chief qualifier of citizenship. Indeed, Rauch further emphasized his ethnocentric analyses by claiming that it is not "necessary" for immigrant residents to "wait for municipal, State or National action or appropriation." Instead, every "householder should see that his or her premises and surroundings are placed in the best possible sanitary condition without delay."[280] In this address to the Sanitary Council, Rauch suggested that public health professionals and their agencies remained free of responsibility for the protection of citizens' health. Rather, their own health care, even if industrial pollution threatened it, was the concern of immigrant communities deemed incapable of such action.

Despite the coordination offered by the Sanitary Council of the Mississippi Valley, and the completion of water pumps at Fullerton avenue, water pollution and the political specter of drainage loomed over the city.[281] The Great Chicago Fire revealed both a water distribution and wastewater removal problem. Chicago's municipal infrastructure, strained by an exploding population that neared 600,000 by 1885, could not keep pace with the city's complex demand for water. Fire had given an opportunity for a rebirth, which Chicago's boosters touted, but it only

[280] Ibid.
[281] "Chicago Drainage: Another Meeting of the Citizens' Association Committee," *The Chicago Daily Tribune*, 27 February, 1880.

unveiled old problems that had grown monstrous. Although new construction commenced, distribution and drainage only grew in importance. Flooding remained a concern. As wastes accumulated in city streets, the city's aldermen pondered the threat a catastrophic flood would present.

Flood: A Stormwater Drainage Disaster

Potential inundation could carry refuse from heavily polluted sectors to other neighborhoods in the city. Residents saw the threat as well. Between 1880 and 1881, residential activists focused on smaller, localized improvements to neighborhood infrastructure and waste-disposal. Merchants, with the assistance of the CAC leadership, committed their efforts to street pavements to mitigate the odors of household wastes dumped on sidewalks and roadways.[282] Water contamination, however, garnered the most attention. In 1880, the Chicago City Council appointed a city engineer specifically committed to sanitation in Lakeview, a prominent neighborhood on the North Side.[283] In communication with the Chicago City Council, and the Boards of Sewerage and Water Commissioners, the CAC concluded that to adequately facilitate drainage of the Chicago River's North Branch, and the sewer system, a separate canal for the purposes of water and sewage diversion proved necessary.[284] The CAC reported the proposed canal to be a "ship canal," one that would combine the city's commercial needs with sanitation improvement. By late 1880, the CAC had developed its own committee on sewerage in Chicago

[282] Citizens' Association of Chicago, *Annual Report of the Citizens' Association of Chicago*, "Street Pavements," (Chicago: Hazlett and Reed Publishers, 1880), 8.; Citizens' Association of Chicago, *Annual Report of the Citizens' Association of Chicago*, "Street Pavements" (Chicago: Hazlett and Reed Publishers, October, 1882), 12.
[283] "The Drainage Problem: Lake View and the Fullerton Avenue Conduit," *The Chicago Daily Tribune*, 3 June, 1881, 1.
[284] Citizens' Association of Chicago, *Annual Report of the Citizens' Association of Chicago*, "Ship Canal" (Chicago: Hazlett and Reed Publishers, October, 1880), 21.; Chicago Board of Sewerage Commissioners

called the Sewerage Committee of the Citizens' Association of Chicago. The committee issued its first report in conjunction with the CAC's Annual Report, which they released every October.

Committed political activism from within the CAC generated vital sanitary action for residents on the city's North Side, despite the more rapacious pollution that contaminated the Chicago River's South Branch. Drainage discussions, as well as those concerning general sanitary improvement, assumed a pronounced divide between the city's South and North Sides. CAC Secretary John Ambler secured direct communication with engineers on the Board of Sewerage Commissioners, which led to rapid improvements of water drainage and roads in the Near North Side and Lincoln Park neighborhoods.[285] Dr. Rauch of the Illinois State Board of Health and the Sanitary Council of the Mississippi Valley also maintained consistent contact with the CAC and its leadership, including Ambler and former president Murry Nelson.[286] Many of Chicago's industrial meatpacking communities, including the Town of Lake neighborhood, experienced severe overcrowding and public wells completely blocked by coagulated sewage.[287] The thousands of Polish, Lithuanian, German, and Czech residents, who battled with typhoid and cholera outbreaks in 1872 and 1873, had few options when discarding their household wastes. Residents living in the North Side, often with the assistance of CAC leadership, at least had access to new water pumps to assist in water drainage.[288] Although the pump at Fullerton avenue struggled to keep pace with Lakeview's population, the tremendous strain placed upon the

[285] Citizens' Association of Chicago, "Sewerage," *Annual Report of the Citizens' Association of Chicago* (Chicago: Hazlett and Reed Publishers, October, 1881), 20.
[286] "The Chicago Drainage Problem," *The Chicago Daily Tribune*, 28 December, 1979.
[287] "Chicago Drainage: Another Meeting of the Citizens' Association Committee," *The Chicago Daily Tribune*, 27 February, 1880.
[288] "The Drainage Problem: Lake View and the Fullerton Avenue Conduit," *The Chicago Daily Tribune*, 3 June, 1881, 1.

municipal sewer system was somewhat lessened. Nevertheless, water pollution on Chicago's North Side continued to provide a significant nuisance and generated near continuous protest.[289]

Political tension hastened the city's sanitation response, but an important environmental event in 1885 increased support for a river reversal. In August, a rainstorm that stretched from northern Minnesota through southern Illinois inundated Chicago and most of the surrounding area.[290] Although many residents suffered flooded basements and downtown tunnels were made useless, the artificial waterways that extended the Chicago River to the Illinois River protected the city from both wastewater and stormwater that would have swamped its most populated sections.[291] The flood forced Chicago's filth away from its populace and vulnerable water distribution system. A natural disaster proved necessary to defend Chicago from its tremendous waste.

Edwin Lee Brown, a member of the CAC's Executive Committee, relayed many of the concerns of residents regarding the flood's ramifications to the Chicago City Council. Brown noted that the "subject of water supply and drainage" had been "prominently brought to public notice as recent events growing out of the recent excessive rains of the past summer and the consequent overflow of the Des Plaines River."[292] The flooding rains brought the "foul condition of the Chicago River" into residents' homes and "caused great alarm and solicitude for the sanitary condition of the city."[293] Brown remained convinced that the "intelligent citizens" of Chicago would force a "system of drainage entirely suited to present and future wants of a large

[289] Citizens' Association of Chicago, "Stenches," *Annual Report of the Citizens' Association of Chicago* (October, 1881), 28.
[290] "And a Flood Came," *The Chicago Daily Tribune*, 3 August, 1885, 1.
[291] "Fortunate Chicago," *The Daily News*, 17 August, 1885, 1.
[292] Letter from Edwin Lee Brown to the Chicago City Council (Chicago: Citizens' Association of Chicago Collections, October 30th, 1885).
[293] Ibid.

district surrounding and including Chicago."[294] Mounting pressure from Chicago's citizenry, according to Brown, necessitated the creation of a special sanitation commission, supported by the City Council, and any resulting municipal agencies. The formation of a public response to Chicago River waste remained at the forefront of residents' demands for improved sanitation.

On November 19, 1885, the City Council established the first agency tasked specifically with addressing sewage in the Chicago River.[295] Its membership included three men, who worked extensively with the Boards of Sewerage and Water Commissioners as engineers associated with Crane Manufacturing Company. T.M. Avery, Carlysle Mason, and T.W. Blatchford composed the Chicago Sanitary Commission and recommended a canal to divert wastewater and stormwater.[296] The Great Flood of 1885 revealed the scale of Chicago's sanitation crisis. Foul smells, city leaders discovered, were the least of the horrors that resided in the Chicago River. Coagulated waste, carried by flood waters during the heavy rains, completely overwhelmed the sewer system that offered so much promise to a weary city. Both Lake Michigan, and the sewers designed to help protect it, were further victimized by Chicago's refuse. Although mostly intact, the Chicago sewer system could not expel wastewater and stormwater quickly enough to prevent contamination of the city's built and ecological landscape. Chesbrough's brainchild could not contend with unregulated industrial waste disposal. Flood waters proved that they could carry sewage throughout the city and that proximity of residents to the contaminated Chicago River meant that removal of wastes became necessary. The movement of sewage away from Lake Michigan and potable water wells represented the only viable solution for the city's sanitation crisis. Stormwater, therefore, also brought an inundation with

[294] Ibid.
[295] Letter from R.J. Crane to John C. Ambler, (Chicago: Crane Bros. Manufacturing Co., November 19th, 1885).
[296] Ibid.

public complaints, and calls for action. The CAC, already famous for its scathing critiques of the city's sanitation leadership, continued to utilize the words of other merchants and residents downstream to bolster their calls for a new sanitation infrastructure.

Conclusion

Chicago's first sewer system provided the city with desperately needed sanitary improvement, although it failed to keep pace with the population growth. Between 1851 and 1885, Chicago experienced tremendous growth that strained both its ability to dispose of household wastes, and the sanitation theories that governed the period. Chesbrough's unprecedented efforts, which, literally, uprooted the foundations of Chicago's infrastructure failed to address the city's primary environmental crisis: the city's water supply threatened its residents' health. The prosperity brought by industrial meatpacking and lumber, among other enterprises, created one of the worst sanitation crises the country had seen. Perhaps more ironic still, was that those same industries also supported immigrant working families who faced the worst of Chicago's water pollution. These ironies accompanied every attempt to improve the city's sanitation.

After the Great Fire of 1871, Chicago's infrastructural limitations were laid bare. Improvement to the city's drainage systems, roads, and construction practices reflected ongoing debates about the protection of the city from fire and disease. Conversations about how to address these nagging questions adopted a national perspective and involved greater cooperation to maintain the cleanliness of Chicago's water and citizenry. The sanitary crisis reflected the disaster of 19th-century urban America, where pollution, disease, fire, and flood all intersected. The Flood of 1885, much like the Fire of 1871, revealed the disaster, also, of failing to regulate those who abused the city's ecology through waste-dumping. Nonetheless, sanitary

conversations that followed the Flood attempted to solve Chicago's sanitation crisis while protecting industrial development. Technocratic reformers accepted the false choice of defending economic health at expense of the public's health. Confronting sewage proved more attractive than confronting capitalism itself.

Chapter III: Diversion, Immigration, and Public Health, 1885-1889

Citizens' Association of Chicago (CAC) Secretary, John C. Ambler, had a tough job. Acting as one of the primary conduits between the city's residents and municipal leadership, Ambler faced a difficult balancing act. Ambler's position offered an opportunity to spearhead reforms to Chicago's sanitation, while also establishing a prominent role for himself within the CAC and the city's growing community of political activists. Unfortunately for the CAC Secretary, both sides often opposed one another. To make matters worse, the Great Flood of 1885 reflected the horrifying scale of Chicago's industrial waste and the extent to which industrial pollution had permeated the city's infrastructure and ecology.[297] Service aboard the CAC's Board of Trustees, however, allowed Ambler to seize the situation and create political leverage. The devastation wrought by flooding rains and coagulated waste presented much greater political pressure than rhetoric ever could. Through citizen complaints, which inundated CAC offices in Downtown Chicago, Ambler continued the long march toward the organization's primary objective: drainage. Chief Engineer of Chicago's Board of Sewerage Commissioners, Ellis Chesbrough, first recommended the complete drainage of wastewater from the city's primary sewage mains.[298] That suggestion, however, generated significant criticism from the CAC, primarily because of its financial cost. As Chicago attempted to recover from destruction wrought first by fire in 1871, and then water in 1885, many of the city's most prominent

[297] "And a Flood Came," *The Chicago Daily Tribune*, 3 August, 1885. For further reading on the 1885 flood in Chicago and its relationship with the Chicago River see: Louis P. Cain, *Sanitation Strategy for a Lakefront Metropolis: The Case of Chicago* (DeKalb, IL: Northern Illinois University Press, 1978)., David M. Solzman, *The Chicago River: An Illustrated History and Guide to Its Waterways* (Chicago: University of Chicago Press, 2006)., Libby Hill, *The Chicago River: A Natural and Unnatural History* (Carbondale, IL: Southern Illinois University Press, 2016)., Arlan J. Ruhl, "Flood Control and Drainage," *The Encyclopedia of Chicago* (Chicago: Chicago Historical Society, 2005).

[298] Citizens' Association of Chicago, *Annual Reports of the Citizens' Association of Chicago*, "Drainage" (October, 1880), 13.

merchants and leaders serving in elected roles, believed that drainage was too important to ignore any longer. As Secretary of the CAC, Ambler could lead the charge.

The prospect of improving Chicago's drainage, unfortunately, remained unpopular. Ambler sought conversation and debate with the region's leading engineers, including those within the Civil Engineers' Club of the Northwest. Although Chesbrough, the Board of Sewerage Commissioners, and the CAC's Board of Trustees, all agreed with drainage, other engineers and public health officials, remained skeptical. Most critical of the drainage proposals included those sanitary experts serving on the Sanitary Council of the Mississippi Valley, a regional organization formed by engineers, public health professionals, and sanitarians concerned about riverine pollution. Expense was one point of contention, but it was where the sewage would go and who would deal with it that proved most concerning.[299] The 1885 Flood provided a terrifying natural counterpoint. Put simply, Chicago could not merely dilute sewage or store it to clean the city and mitigate the spread of water-borne illnesses; the water had to go somewhere. While the city's leadership, including engineers, political activists, and municipal officials avoided confrontation with Chicago's the false choice of the city's sanitary crisis, the CAC demanded that citizens' concerns be heard. The CAC concluded that Chicago needed a completely new sanitation infrastructure to accommodate rather than constrain the dumping habits of the city's most profitable industries.

The "Diversion" Concept

Between 1885 and 1890, city, state, and national cooperation intensified in response to Chicago's sanitation crisis. The Sanitary Council of the Mississippi Valley introduced specific

[299] *Sanitary Council of the Mississippi Valley*, "Address of the Committee on General Sanitation" (Hamilton, OH: Democrat Job Rooms Print, 1880), 27.

solutions to Chicago's "drainage problem", marking the situation as one of regional concern.[300] The most radical of these drainage methods was the drainage channel concept, which involved reversing the Chicago River. The Illinois and Michigan Canal (I&M Canal), which first connected Chicago and the Mississippi River, also contained Chicago River water pollution.[301] Connecting Chicago with towns in the Illinois River Valley, the I&M Canal brought the city's wastes closer to rural residents. Illinois River Valley communities voiced concerns about a drainage canal in Chicago.[302] The national movement toward improved sanitation and expanded civil service triumphed over local concerns. Chicago's drainage, framed by the "diversion" of the Chicago River's fetid waters, became a sanitary and commercial necessity.[303] Chicago and the State of Illinois concluded that the project would strengthen the national movement toward sanitation reform. Downstream opposition to the reversal of the Chicago River shaped the development of diversion strategies, rather than halted them, creating an urgency that only bolstered engineers' claims to regional control.

James M. Barker, an engineer in Appleton, Wisconsin responded questions posed by John C. Ambler, offering professional analyses of the proposed drainage solutions along with stern warnings. Although the Board of Sewerage Commissioners specifically suggested a drainage channel, Murry Nelson and others within the CAC, first recommended the diversion of

---

[300] *The Chicago Daily Tribune*, "Chicago's Drainage Problem" (29 December, 1879).
[301] For further reading on the I&M Canal, see: Michael P. Conzen and Kay J. Carr, *The Illinois and Michigan Canal National Heritage Corridor: A Guide to its History and Sources* (DeKalb, IL: Northern Illinois University Press, 1988)., George Rogers Taylor, *The Transportation Revolution, 1815-1860* (New York: Routledge, 1977)., Solzman, *The Chicago River*., Hill, *The Chicago River*., Richard Lanyon, *Building the Canal to Save Chicago* (Chicago: Lake Claremont Press, 2012).
[302] This chapter uses the term "downstream" to refer to communities, cities, municipalities, and areas along the Illinois River, south of Chicago. The term, although broad, in no way serves to minimize or denigrate rural areas. The commonly-used term "downstate," used by Chicago journalists, has received criticism from rural Illinois residents. "Downstream" emphasizes rivers, and the flow of waters carrying pollution that concerned many residents living along the state's major waterways. The author hopes that this term reinforces the importance of riparian ecologies and rural peoples.
[303] This historical term for reversal. Engineers used this term when referencing the literal reversal of the Chicago River

wastewater. The CAC, therefore, supported drainage, in concept, to further citizens' interests. Thus, it possibly surprised the CAC when Barker completely challenged the idea. The Civil Engineers' Club of the Northwest had presented the regional engineering community with a more complicated solution that involved an integrated sewage-removal and water-purification system.[304] Combining sewage removal, water supply, and water purification, according to Barker, represented a potential threat to the entire system. Although not the exact solution that the CAC sought to champion, the support for better sanitation remained sound. Barker confirmed citizen interest, but noted his concerns surrounding urban drainage. He remained "wary of such interests in the subject" clearly marking convoluted political tensions involved in Chicago's sanitation discussions.[305] Furthermore, Barker contended that drainage may not provide the comprehensive solution the city's engineers envisioned. Instead, "dilution…at high temperatures," provided a more effective response.[306] Rather than dilute wastewater and potable water in the same process, Barker argued that they be "*kept separate*," and that sewage dilution would "satisfy the demands (for better sanitation)…with complete success."[307]

Regional attention paid to Chicago's proposed canal elicited debate about a reversal's necessity. The financial and political support, amassed by the CAC, might prove moot. Ambler replied to Barker's initial call for the separation of waste and water supply, where he articulated the "Association's desire for a drainage channel as recommended by the Chicago Sanitation Commission."[308] Ambler stated that it was the Association's plan to separate the "water supply

---

[304] Ellis Chesbrough, *The Civil Engineers' Club of the Northwest*, "Report of the Committee on Drainage" (Chicago: The Civil Engineers' Club of the Northwest, 1 July, 1878).
[305] Letter from James M. Barker to John C. Ambler (Chicago: Citizens' Association of Chicago Collection, August 29th, 1887). This letter discusses the potential benefits of a new drainage channel for downstream communities, particularly as it pertains to sanitation and commercial improvements.
[306] Ibid., 2.
[307] Ibid., 3. Italics are original author's emphasis.
[308] Letter from John C. Ambler to James M. Barker (Chicago: Citizens' Association of Chicago Collection, September 28th, 1887), 1-2.

for domestic purposes from sewage contamination" by "turning the sewage of the whole district about Chicago into the Des Plaines, and letting it pass with almost infinite dilution into the Illinois and Mississippi Rivers."[309] What Ambler proposed then, was a separate canal devoted entirely to sewage diversion. At 200 miles long and eighteen feet deep, a drainage channel, that flowed into the Illinois River, would offer the necessary dilution of sewage and safely separate waste and water supply. The flow and amount of water in that waterway would degrade any sewage sent toward it.[310] Once the wastes flowed away from Chicago, the remaining water would not require "oxidation… for household or domestic use."[311] The separation of wastes from Lake Michigan would then allow those who would use the water to access it themselves, thus opening the city's water supply for sewage, drinking, and navigation.

Although a novel idea, Barker remained unimpressed. In response to Ambler, Barker addressed the potential usefulness of a drainage canal. If Chicago were to solve its sanitation challenges, Barker concluded, it had to contend with the "source of its pollution:" industrial enterprises. Furthermore, Baker argued that a new sanitary channel and any "mechanical industries" would remain subject to "*regulation* to meet these purposes" and that, as a result, he could not accurately determine that a canal would prove useful.[312] Once a proposed canal dealt with the city's sewage and any remaining flood water and effluent, via reversal, Barker concluded that "*then it will be time that the waterway would have to be regulated*."[313] Casting doubt upon the proposed solution of drainage, Barker maintained that to protect the city and its

---

[309] Ibid., 1.
[310] Letter from John C. Ambler to James M. Barker (Chicago: Citizens' Association of Chicago Collection, October 4th, 1887).
[311] Letter from John C. Ambler to James M. Barker (Chicago: Citizens' Association of Chicago Collection, September 28th, 1887), 1-2.
[312] Letter from James M. Barker to John C. Ambler (Chicago: Citizens' Association of Chicago Collection, October 8th, 1887), 2. Italics are original author's emphasis. Here, "mechanical industries" refers to industrial meatpacking, lumber mills, and brick foundries, all of which dumped waste in the Chicago River.
[313] Ibid. Italics are original author's emphasis.

residents from sanitary problems, regulated waste disposal was necessary. Without such measures, waste dumping in the river would continue indefinitely. Time also worked against Chicago's sanitary reform efforts. A drainage channel presented a massive commitment of monetary and human resources that the city lacked time to provide. Barker stated that as he "looked upon it…the disposal of sewage… is a gigantic experiment involving large outlays of money and consuming many years of valuable time and keeping your whole city in suspense of living in filth, with the expectation of *sometime* of 'getting cleaned up.'"[314] Barker's scathing indictment of Chicago's sanitation reveals the regional view of the city's ambivalence to industrial exploitation of its most vital natural resources. Nonetheless, Barker offered a path forward. He ensured Ambler that the CAC and any other sanitary agency could rectify the situation by "considering all sides," particularly the conclusions of rural conventions at Peoria, Illinois.[315] Ultimately, Barker's analysis reveals the importance of rural and regional cooperation in the river reversal process. The regulation of private industries, however, proved a far more difficult endeavor.

Regional observations served to illustrate the political and economic risks associated with Chicago's pollution crisis. The contamination of the Chicago River was a potential scar for the city's reputation and threatened economic advancement while degrading public health. The shadow that Barker cast of an endangered citizenry, wallowing in fetid waters and the stench of failing sewers, surely caused profound concern among political and economic leaders. Barker's prognostication offered both dread and opportunity for the CAC. His evaluations of Chicago's

[314] Ibid., 3. Italics are original author's emphasis.
[315] Ibid., 4.; "Drainage Issue," *Peoria Journal*, 28 February, 1888. The *Peoria Journal* substantiated much of the opposition to the drainage channel project, articulating the concerns of rural residents writing to the paper, and reporting on the proceedings of citizens' conventions.

sanitary challenges no doubt provided the organization with greater leverage with which they could use to institute changes.

Political pressure from the CAC did more than simply illuminate the city's sanitation crisis. Murry Nelson, Richard Prendergast, and other CAC leaders convinced municipal and state leadership that Chicago required a sanitation infrastructure devoted to sewage diversion. Rather than simply delegate the city's sanitary solutions to private agencies, Nelson and the CAC sought a coalition of support.[316] Acting with municipal authority and funding, Nelson favored public cooperation from the city, the Illinois General Assembly, and even Congress. A collective response from multiple public entities remained necessary to improve Chicago's water quality. Combined with the funding and political organization to mount such action, the CAC convinced both Congress and the Illinois General Assembly to establish an entirely new agency with jurisdiction in Chicago and along the Illinois River.[317] Nelson argued that any sanitation agency tasked with improving the Chicago River would need to access the places where the city sent its sewage.[318] Infrastructure and organizational leadership were both essential for an effective sanitation response.

The formation of a statewide agency, with its leadership centralized in Chicago and a broad jurisdiction, proved a difficult sell to rural communities along the Illinois River. Nelson recommended that the new agency adopt a careful legal strategy to ensure that any potential reversal project involved citizens affected. Nonetheless, the CAC remained steadfast in its public commitments to Chicago, something that many residents along the Illinois River found troubling.

---

[316] Citizens' Association of Chicago, *Annual Reports of the Citizens' Association of Chicago*, "Drainage," (October, 1880), 14.
[317] *The Illinois Drainage and Waterways Enabling Act*, The Illinois General Assembly, (State of Illinois Publishing: 1889).
[318] Citizens' Association of Chicago, *Annual Reports of the Citizens' Association of Chicago*, "Drainage", 15.

Public officials, including mayors and city councilmembers in the Illinois River Valley, held conventions for residents to discuss "diversion of sewage" from Chicago downstream.[319] Nelson received numerous reports of opposition not only to the city of Chicago and the Illinois General Assembly, but also to the CAC itself. The confrontation between urban and rural residents, both affected by the same pollution, illustrated the complexity of the political situation. This conflict also belied the uncertainty of the plans offered by Chicago's engineering community.[320]

The Flow of Opposition

Although the CAC offered its complete support for diversion, opposition remained. The City of Chicago and the State of Illinois suggested the organization of public meetings in downtown Chicago to discuss the plans for the project and describe to state residents the particulars of the process.[321] Constituents from surrounding communities such as Des Plaines and Joliet expressed approval for the project, demanding that the proposed canal resolve their own sanitation issues.[322] The Peoria Conventions between 1885 and 1888 had secured tentative agreement on the drainage question. Central Illinois journalists mounted effective political pressure in advancing their interests at those meetings. Evidence gathered through public health studies mostly neutralized political opposition in Springfield. As information regarding Chicago's horrendous living conditions wafted throughout the region, those originally committed to the reversal project re-considered their support. Although the CAC, City Hall, and the General

[319] "River Conventions," *Peoria Journal*, 28 June, 1888.
[320] "Drainage Problem," *Ottawa Plain-Dealer*, 28 June, 1888.
[321] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal* (Chicago: City of Chicago Publishers, 1924), 376.
[322] Citizens' Association of Chicago, "Main Drainage" (Chicago: Hazlett and Reed Printers, November, 1880), 15.; *History of the Chicago Sanitary and Ship Canal*, 376.

Assembly succeeded in forming a sanitary agency, the proposed drainage canal's future remained uncertain.

Opposition continued through 1890 with the circulation of dire public health statistics throughout the Illinois River Valley. Such data frightened rural residents. The Peoria Conventions and General Assembly debates convinced, initially, diversion opponents that a larger canal would mean increased river traffic in the Illinois Valley. Towns along the river would receive upgraded shipping infrastructure, which would enhance the ability of towns, including Peoria and Ottawa, to accept riverine shipments. As the General Assembly persisted in its reversal discussions, the CAC, the Board of Sewerage Commissioners, and many communities south of Chicago grew wary of the glowing promises made by politicians and technocrats.

Nowhere was this more apparent than in Peoria itself, site of the earlier conventions that debated diversion. Peoria's municipal officials, despite their fellow residents' support of diversion, coordinated further opposition in the town's press. It appeared that Peoria's media and some of its city leadership wanted it both ways. Indeed, Peoria's mayor, John Warner, wrote to the *Peoria Journal* in 1888 urging that the city "should take the lead for it is most committed in the Illinois Valley to oppose Chicago."[323] Clearly, Peoria's political leadership served as a self-stylized vanguard for the town's financial interests. Should Illinois Valley communities succeed in their opposition to Chicago, Peoria stood to benefit more from increased riverine shipping. Revenue seemed inadequate, nonetheless. A Peoria city council member, who remained anonymous, stated that "we here in Peoria have placed ourselves squarely on the record as

[323] "Our Waterway," *Peoria Journal*, 12 December, 1888. The Abraham Lincoln Presidential Library in Springfield, IL has an impressive collection of rural newspapers throughout the state of Illinois. It was there that these newspaper articles may be found. Hereafter, the chapter maintains the name "*Journal*" when referencing the *Peoria Journal* newspaper.

opposed to the South Chicago route proposed by some as the most feasible for the national waterway."[324] More residents along the Illinois River quickly joined Peorians in their battle against drainage, despite having offered support after the Peoria Conventions. Continual political pressure offered the town and residents in the surrounding area with leverage, a slice of the commercial shipping pie. Wealthy Peorians wanted the new drainage canal and hoped to signal their support to the convention.

Peorian politicians promulgated the idea that Chicago's industrial wastes would soon flow toward the Illinois Valley undiluted to guarantee their public's safety. Sanitary concerns, much like how they were employed at the Peoria Conventions, provided an effective bargaining chip. Should Chicago's engineers not treat industrial refuse, public perceptions of drainage would hinder the agency's ability to market the project as an achievement. Peoria's demands would be satisfied. Much like the CAC before them, the writers for the newspaper saw this as a violation of their right to clean air and water. As concerns grew about unfiltered, polluted river water, rural residents, and particularly politicians writing to the *Journal*, saw Chicago's sanitary crisis as one they shared with urban dwellers. Declaring the "Chicago cesspool" a threat to their public health and well-being, the city council member stated that "an ample supply of pure water and air" were "the birthright and inheritance and that of every man, woman, and child in the land and those to come." To defend these inherent rights to safe drinking water, and commercial opportunity, Warner, a long-time Illinois-Valley political institution in and of himself, referenced the War of Independence in his opposition to the proposed reversal plan. Warner suggested that residents in the Illinois Valley "unite" to confront Chicago's drainage plan to protect their rights to life, liberty, and property, which he believed that Chicago threatened to destroy. The Peoria

[324] Ibid.

mayor invited neighbors to unite their "brethren of the Illinois Valley, and the press, and the Mississippi Valley, and lake region to hoist the same old flag of the thirteen states of the revolution to win a victory of all our states of the day and of the future."[325] Warner proclaimed that a "united press can do much of this work." A *Journal* staff writer then stated that those at the paper agreed with their city's mayor and they further called for a "new conference to negotiate a new agreement that properly accounted for the interests of the Illinois Valley." Using their local print media, particularly in Peoria, Illinois River Valley politicians mounted a coordinated opposition to Chicago's technocratic reformism.

Suggesting that the Peoria Board of Trade call a new convention, Warner positioned himself to lead another assault on the reversal project. The new conference proposed would be a "lively, wide-awake interest in the matter and it seems as if steps should be taken at once, whereby the representatives of the Illinois Valley would be called together for the purpose of comparing notes as the ball opens in Springfield." Referring to the start of construction as a "ball," Warner suggested direct political action against both the General Assembly and Chicago's reversal proponents. Additionally, Peoria's chief executive believed that such a conference was necessary to defend the Illinois Valley's fundamental rights and warned that if a "substantial union is not secured by some timely means, it will be a difficult matter to head off the Chicago men." To mount an effective resistance, Warner proclaimed that the "Illinois Valley should present its claims too(sic) parity to the balance of the state in clear, ringing, unmistakable terms…failure to do so is equivalent to putting the leading trump cards into the hands of the Chicago contingent." Warner, and likely many of his merchant allies, believed that their environmental and financial concerns were at stake.

[325] Ibid.

The General Assembly and the CAC proved unsuccessful in assuaging the reticence of Peorians and other Illinois Valley residents. Such a conference benefitted Peoria, politically. Framing a meeting to resist diversion as of interest to the broader Illinois Valley served to establish more coordinated opposition. A *Journal*'s staff writer argued that the "present trials affords a glorious opportunity for Peoria's representatives to take the floor and immortalize themselves."[326] Economically and politically, opposition to Chicago's drainage was obviously beneficial to many residents in the Illinois Valley. This presented reversal's defenders with a difficult situation. Rural support was essential, and many Illinois Valley communities possessed substantial influence in the General Assembly.[327] Fears of another work stoppage emerged. New information about the fetid "Chicago cesspool," according to a Peoria city councilmember, turned many more Illinois Valley residents against the reversal proposal.

Fears of a river of waste that threatened the entire Illinois River Valley with contamination was not a new concern. This particular issue had distressed urban and rural residents for over two years.[328] Meetings of the Civil Engineers Club of the Northwest in 1887 had provided the basis for how the CAC and Chicago's representatives in the General Assembly would argue in favor of drainage.[329] Although some towns, including Ottawa, and individual residents along the Illinois River supported diversion, they did so in hopes of securing increasing shipping revenue. By contrast, Peorians expressed reticence about just how a reversal of the Chicago River would really serve their financial interests.

---

[326] Ibid.
[327] The Board of Illinois Canal Commissioners, "Proceedings of the Board of the Illinois Canal Commissioners, 12 August, 1889," *Minutes of the Board of the Illinois Canal Commissioners* (Springfield: Illinois State Archives, Illinois State Archives Center, 1889), 35.
[328] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 376-7.
[329] Samuel S. Greeley, "The Riparian Question: A Paper Delivered Before the Civil Engineers Club of the Northwest," *Meeting Minutes of the Civil Engineers Club of the Northwest*, (Chicago: Chicago Historical Society, 7 February, 1876), 1-8.

Journal staff writers published numerous articles illustrating the risks of the river reversal to rural communities in the Illinois River Valley and the futility of supporting drainage as a solution. Journalists' criticism of Chicago and the General Assembly, however, articulated Peoria's interests. Towns that joined the reversal project, namely Ottawa, also received bristling attacks. Peoria mayor John Warner, again penning an editorial in the *Journal*, opined that "our neighbors in Ottawa are apparently not with us" on the drainage issue and proclaimed that the city of Ottawa instead "sided with the Chicago cesspool" an "impossible decision to make," according to Peoria's chief executive.[330] Mayor Warner, Peoria city councilmen, and *Journal* reporters pitted Illinois Valley residents against one another to leverage their position within the drainage debate.

The *Journal* was the primary vehicle for this agitation. Technocratic experts on the Board of Sewerage Commissioners remained the primary targets of Illinois River Valley opposition. Peoria politicians specifically criticized the board, the General Assembly, and Chicago City Hall's negligence in its handling of the complex set of financial needs involved in the drainage channel project. The Peoria Conventions subsequently established the basis for commercial shipping revenues for Peoria and Ottawa. This precedent remained the standard by which Peoria's political and economic leadership held Chicago's engineers, technocrats, reformers, and politicians. For the *Journal*'s staff writers, Chicagoans had defiled the agreement established at the conventions and ignored the interests of those forced to receive Chicago's polluted water.[331] A reporter at the *Journal*, again anonymous, declared the that the "Sewerage Board's goals are

[330] "Our Waterway," *The Peoria Journal*, 12 December, 1888, 2.
[331] "The Ship Canal," *Peoria Journal*, 1.

great follies designed to advance the interests of Chicago."[332] Rural journalists found themselves unconvinced that the Board of Sewerage Commissioners would protect them from sewage.

Notably, *Journal* reporters documented that the sewage would flow through the Chicago River, undiluted. The original strategy, first crafted by Chesbrough and later adopted by the CAC and the Board of Sewerage Commissioners, appeared inadequate as a sound sanitation strategy. A Peoria merchant, also anonymously writing to the *Journal*, exclaimed that what the "people along the Illinois River want is a ship canal and increased shipping facilities. What the people of Chicago want is a small ditch to run off their sewage."[333] Ultimately, the author considered whether the General Assembly would allow this to take place, particularly if Chicago's sanitarians exceeded their mandate. The merchant wrote, "this is the whole issue in a nut-shell: it is not likely that the whole state is willing to allow the Illinois River to become a mere sewer for Chicago."[334] Public letters to the editor, journalists' reporting, and politician editorials, suggest that Peorians were prepared to fight such an application of the proposed reversal. Print media continued to serve as Downstate Illinois's primary defense mechanism against Chicago's economic and environmental control.

Between December 9 and 11, 1888, the *Journal* reporters published series of articles illustrating the air and water quality found in Chicago neighborhoods most affected by the city's slaughterhouse wastes. Found in the articles was the assertion that "the same disasters having so afflicted Chicago would be sent, with the city's horrid refuse, toward towns like Peoria."[335] Diseases including typhoid and diphtheria also alarmed residents living downstream from Chicago. A Peoria banker wrote to the *Journal* about such concerns, concluding that Chicago's

[332] "Board of Health," *Peoria Journal*, 27 January, 1889, 1.
[333] "The Drainage Issue," *Peoria Journal*, 9 December, 1888, 1.
[334] Ibid.
[335] "Drainage Matters," *Peoria Journal*, 10 December, 1888, 1.

"crooks and cranks," a reference to the city's political and economic leadership "sought not to purify itself, but to pollute everything else."[336] Interestingly, this banker's contention was not that the diversion of pollution was the primary problem. Instead, his assertion was that Chicago's engineering, sanitary, and political leadership did not conform to a level of competence that he believed they should. The failures of the city's technocratic experts did not inspire confidence in Downstate communities located in the path of Chicago's sewage.

Chicago's pollution reflected a corrupt political system to Illinois River Valley towns. If Chicago continued to placate the interests of businesses and the politicians they funded, the city would continue to "pollute" the Chicago River and "the penitentiary with politicians and anarchists." Central Illinois politicians and merchants believed that Chicago's leadership would only feed the same political and economic machine that created the problems that engineers, technocrats, physicians, and reformers sought to solve.[337] Most problematic, therefore, was not a contaminated river and where its waters flowed, but how engineers and politicians managed it. The anonymous Peoria banker surmised that the "confounding drainage situation would result in an intriguing political event" that would "make a pretty good watch" from the legislature on the "evil effects of sewage in the river," but that the "day of dynamite will evidently not relish these experiments."[338] Casting doubt on the city's sanitation solutions, letters written by affluent Downstaters, published in the *Journal*, suggested that the environmental quandary facing Chicago was rooted in socio-political circumstances. Those complexities, according to Central Illinoisans, were lost on the Board of Sewerage Commissioners and Chicago's municipal leadership.

---

[336] Ibid.
[337] "Drainage Problem," *Peoria Journal*, 11 December, 1888, 1.
[338] Ibid.

Engineer Lyman Edgar Cooley favored reversal. After the 1885 flood brought the Chicago River's waters, and the city's gravest concerns, into residents' homes, Cooley had the evidence to make a convincing case for improved drainage. The Chicago River, afoul with the refuse of Chicago's economic progress had overflowed and collected in the Illinois and Michigan (I&M) Canal, adding to the environmental suffering borne by the city's south-side residents. Working for Chicago's Board of Drainage Commissioners, Cooley found job security through this public suffering. Cooley performed that job well. In his pamphlet *The Lakes and Gulf Waterways*, delivered to the Illinois General Assembly as an argument for the creation of a state sanitation agency, Cooley outlined why Chicago and the Illinois River Valley should commit its faith to canals.[339] Riverine travel, as Cooley contended, was necessary for the prosperity of Illinois. So self-evident was river transport that he claimed it was "not necessary to recall the importance of Chicago's marine commerce, to her prosperity, or the need of fostering it."[340] Railroads, according to Cooley, were not as large a "factor in our industrial development, to which, rather than to trade, we must look for future growth and prosperity." Sanitary improvement was crucial, but Cooley knew that monetary profit motivated action.

[339] Historical geographer Michael Conzen has documented this history extensively in his work. See: Amy D. Alberts and Michael P. Conzen, *Looking for Lemont: Place and People in an Illinois Canal Town* (Studies on the Illinois and Michigan Canal Corridor) (Chicago: University of Chicago Press, 1994).; Michael P. Conzen, *Illinois Canal Country: The Early Years in Comparative Perspective* (Chicago, 1991).; Michael P. Conzen and Andrew R. Daniel, eds., *Lockport Legacy: Themes in the Historical Geography of an Illinois Town* (Studies on the Illinois and Michigan Canal Corridor) (Chicago: University of Chicago Press, 1990).; Michael P. Conzen and Melissa J. Morales, et.al., *Settling the Upper Illinois Valley: Patterns of Change in the I&M Canal Corridor, 1830-1900* (Studies on the Illinois and Michigan Canal Corridor) (Chicago: University of Chicago Press, 1989).; Michael P. Conzen and Diane Dillon, eds., *Mapping Manifest Destiny: Chicago and the American West* (Chicago: Newberry Library, 2008).

[340] Lyman E. Cooley, *The Lakes and Gulf Waterway: As Related to the Chicago Sanitary Problem-The General Project of a Waterway from Lake Michigan to the Gulf of Mexico: In Respect to the Chicago Terminus, Physical Features of the Route, Character of the Project, its Utility, and the Methods of its Accomplishment-A Preliminary Report with Appendices, Maps, and Profiles*, (Chicago: Press of John W. Preston, 1888), iv. This pamphlet is archived at several universities, including Harvard. A digital copy is accessible via hathitrust.org.

In sharp contrast to James Barker, of Appleton, Wisconsin, Cooley performed the role of engineer-as-booster, an adept champion of economic prosperity through engineering. Cooley understood the potential power of municipal bureaucracy to effectuate change and displayed a willingness to wield that authority. The industrialists who helped build the city's wealth would not face consequences for the pollution they generated, but for Cooley and other Chicago technocrats, this pollution presented an enticing opportunity; seizure of the city's environmental problems and regulating an unpredictable landscape. Baker demonstrated the engineer-as-unbiased-expert, where Cooley engaged his profession on more strident, political terms. Risky as it was to assume such a responsibility, Cooley knew that the diversion of the Chicago River offered a chance to control an ecology that had vexed municipal leaders since the city's founding, and a chance to control an infrastructure that extended beyond Chicago's limits.[341]

Cooley and his allies supporting reversal met opposition from within the engineering community. Politicians also viewed the concept warily as they pondered the staggering cost that such a project would command. In addition to reversal's possibility and monetary expense, diversion elicited concerns in the region about unnecessary decreases in the lake's water level. The CAC requested engineering analyses of the water flow through the proposed drainage channel and the effect on Lake Michigan's depth. Engineer James H. Wilson of Wilmington Delaware responded to the request. Upon reading Cooley's statements regarding diversion, Wilson determined that the CAC's proposed canal, at 600,000 cubic feet per second (cfs), would not significantly lower the lake's water level.[342] Although far less politically inclined to support

[341] For regional environmental histories that contextualize the sanitary situation in Chicago during the nineteenth century, in addition to Conzen's extensive work, see: Joel Greenburg, *A Natural History of the Chicago Region* (Chicago: University of Chicago Press, 2002).; Wayne Grady, *The Great Lakes: The Natural History of a Changing Region* (Vancouver: Greystone Books, Douglas & McIntyre Publishing Group, 2007).; William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton and Co., 1992).

[342] Letter from James H. Wilson to Main Drainage Committee of Chicago (Chicago: Citizens' Association of Chicago, April 25th, 1888), 2. Lyman E. Cooley worked as an engineer with the Main Drainage Committee in

diversion, Wilson proclaimed himself "satisfied that such a discharge would not appreciably disturb the Lake (sic) level," Wilson concluded that "the work is more fully justified than it ever has been."[343] Independent analyses, including those provided by Wilson, offered the CAC and the Sanitation Committee the evidence they needed to make their case for the river reversal to downstream communities. Wilson also stated that that in "common prudence, we should not delay in the inauguration of the project for a single month."[344] Rural residents remained skeptical and debated the merits of a deep waterway that would bring Chicago's sewage to their riverside ports.

In response to the community conventions along the Illinois River, the CAC offered promises of local development. National security, easier transportation, and inexpensive water access all provided potential benefits to downstream towns should the diversion of the Chicago River occur.[345] Richard Prendergast touted these benefits at a general meeting of the CAC in 1889. According to the influential CAC member, "great waterpower" was both "necessary and beneficial" for the city and the state, beyond the improvement of sanitation. Prendergast placed the city of Chicago within global context, remarking that in "older countries, in the last twenty or thirty years, there seems to have been a widespread and general awakening to the importance of such waterways and the prosperities of people."[346] With a "grand channel," residents downstream would prosper from commercial transportation. Additionally, supporters of a river diversion cited the "miles of dock property" that would arrive alongside a new drainage canal

---

Chicago and initially drafted plans for a sanitary canal. His report was published in a volume later in 1911: Lyman E. Cooley, *The Deep Waterway Between the Great Lakes and the Gulf of Mexico: Development of the Deep Waterway in Relation to Conservation*, (St. Louis, MO: Lakes to the Gulf Waterway Association, 1911).

[343] Ibid., 3.

[344] Ibid., 4.

[345] The Board of Trustees of the Sanitary District of Chicago, *Proceedings of the Board of Trustees of the Sanitary District of Chicago,* "First Annual Meeting" (Chicago: City of Chicago Publishers, 1890), 105. The Board of Trustees met daily, but the entire SDC met annually to discuss the general progress of the drainage channel project.

[346] Ibid., 106.

and commercial shipping. New commercial development, both along the Illinois River and "in front of Chicago if the people so desired," offered the potential for riverside trade.[347] Although the complexities of shoreline property development required further debate, the solidification of popular support in rural Illinois emerged from the desire to expand commercially. Sanitation was a secondary concern. A reversal of the Chicago River promised not only cleaner water and a more predictable riverine ecology, but a more stable and prosperous economy.

The Sanitary District of Chicago

The reversal of the Chicago River presented another historical example of the tension between public and private ownership of natural resources. According to historian Robert W. Righter, in his book *The Battle Over Hetch Hetchy*, public ownership of land often occurred amidst the machination of private entities, bent on the control of resources, capital flows, and markets.[348] As with the Hetch Hetchy controversy of 1906 through 1908, the diversion of the Chicago River involved the close cooperation and collusion of private interests and public entities. Aldermen on Chicago's City Council and representatives in the Illinois General Assembly benefited politically and financially from the economic prominence of the state's largest city. Public agencies, despite their supposed commitment to the general welfare worked

---

[347] Ibid.

[348] Robert W. Righter, *The Battle Over Hetch Hetchy: America's Most Controversial Dam and the Birth of Modern Environmentalism* (New York: Oxford University Press, 2005), 167-168. See also: Sam Bass Warrner, *The Private City: Philadelphia in Three Periods of Its Growth, Second Edition* (Philadelphia, University of Pennsylvania Press, 1968). Warner's work discusses Philadelphia's urban planning during the nineteenth century as a reflection of private interests. Similar to Righter, Warner contends that public infrastructure and services often supported the expansion of private enterprise and business.; Sarah S. Elkind, *How Local Politics Shape Federal Policy: Business, Power, and the Environment in Twentieth-Century Los Angeles* (Chapel Hill, NC: University of North Carolina Press, 2011).; Sarah S. Elkind, *Bay Cities and Water Politics: The Battle for Resources in Boston and Oakland* (Lawrence, KS: University of Kansas Press, 1998).; Sarah S. Elkind, *Public Works and Public Health: Reflections on Urban Politics and the Environment* (New York: Public Works Historical Society, 1999).; Eric H. Monkkonen, *America Becomes Urban: The Development of U.S. Cities and Towns, 1780-1980* (Berkeley, CA: University of California Press, 1988).; Matthew Klingle, *Emerald City: An Environmental History of Seattle* (Seattle, WA: University of Washington Press, 2009).; Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, OH: University of Akron Press, 1996).

for special interests. Government infrastructure projects often benefited private property. Diversion of the Chicago River, therefore, represented a defense of private interests through public initiative. Technocratic experts, Cooley included, seized the opportunity to defend their colleagues' reputations as the best-equipped individuals to serve the alliance between private and public.

The Board of Sewerage Commissioners also acquired additional authority to complete the drainage work, but it would eventually result in the dissolution of its agency structure. In 1888, the Illinois General Assembly passed the Sanitary District Enabling Act which enabled the state legislators to approve the formation of sanitary districts.[349] Upon passage of the Enabling Act, the CAC organized town hall meetings to help inform Chicagoans about the legislation's scope and parameters. These public meetings offered residents a platform on which they argued the case for immediate and large-scale action to their city aldermen and state legislators.[350] The Enabling Act did not authorize canal construction, nor did it allow the sanitary districts to issue bonds. In 1889, the General Assembly passed an additional law that gave the state sanitary districts bond-issuing abilities for construction.

The formation of state sanitary districts also meant the establishment of such an agency in Chicago. After passage of the Enabling Act, the General Assembly dissolved both the Board of Water Commissioners and the Board of Sewerage Commissioners, combining the responsibilities of both entities in a new organization: The Sanitary District of Chicago (SDC). Comparably to the other state sanitary districts, the SDC had a specific jurisdiction. Their

---

[349] Cooley, *The Lakes and Gulf Waterway: As Related to the Chicago Sanitary Problem-The General Project of a Waterway from Lake Michigan to the Gulf of Mexico*, iv.; Righter, *The Battle for Hetch Hetchy*, 374. While "Hurd" likely refers to the publisher of Illinois legislation, and not the actual title of the law, this is how the SDC identifies the legislation in its narrative.

[350] Ibid., 374. The Hurd Act also placed the limits on the SSC's width as many residents in Ottawa and Peoria expressed concern about the possibility of further flooding in the area if the canal was too large and forced large amounts of additional water through the Illinois River.

responsibilities included Chicago and all areas affected by pollution in the Chicago River.[351] With this authorization from the General Assembly, the SDC formed an advisory board, consisting of two Illinois state senators, two state legislators, and the mayor of Chicago, that compiled reports and observations regarding the SDC's operations in the surrounding suburbs.[352] Board members then made their reports available to the Illinois General Assembly, providing greater transparency of the work performed. Members of this board also helped establish what later became the SDC's Board of Trustees. This board, led by CAC member Richard Prendergast as president, selected Lyman E. Cooley as their Chief Engineer. Chicago's financial and environmental concerns now rested with Cooley. The new SDC Chief Engineer had several options at his disposal, diversion among them.

Reversing the Chicago River still seemed to many on the SDC Board of Trustees complicated and expensive. The agency's leadership, therefore, examined alternative solutions. Initially, the SDC favored a solution comparable to the sewer system and considered building a massive tunnel that connected the river to rural areas beyond the city.[353] This proposed tunnel would move wastes out of the Chicago River and into holding pools. The Board of Sewerage Commissioners began the project in 1866. Pending significant improvements, the SDC viewed the tunnel as a viable waste-removal system.

Popular support, however, proved elusive. Like Ellis Chesbrough before him, Cooley encountered resistance from Chicagoans, rural residents, and from reformers who promoted

---

[351] The Thirty-Sixth Illinois General Assembly, "Illinois Waterways and Drainage Act, 4 June, 1889" *Laws of the State of Illinois* (Springfield, IL: General Assembly of the State of Illinois, H.W. Rokker, Printer and Binder, 1889), 118.
[352] Ibid., 375-376.
[353] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 35. The retrospective report of the Chicago Sanitary District worked backward in its presentation of the canal project, stating the various methods employed by the District in addressing the pollution of the Chicago River, then moving to a discussion of the Illinois and Michigan Canal and then on to a discussion of the formation of the Sanitary District itself. The narrative ends with a chapter detailing the inauguration of the work for the Chicago Sanitary and Shipping Canal.

more sweeping assistance for citizens most vulnerable to industrial excesses. Unlike Chesbrough, Cooley was prepared to act and similarly believed in the diversion plan. Cooley had a state agency that could make the reversal of the Chicago River a reality. Cooley's perspective on the "drainage plan," what contemporaries and colleagues called the reversal, represented a significant shift from earlier sanitation discussions.[354] Rather than debate logistics, cost, and feasibility, Cooley saw reform enacted through public agencies as the most effective route to finalizing the reversal. The SDC, much like the technocratic reformers who led it, viewed its purpose not to enact reforms based on local need, but on the needs of financial, technocratic, and political leaders.

Sanitation problems presented Cooley with a unique opportunity. Chicago "produced more filth per capita," stated Cooley, "than any other city in the country," and the intrepid engineer sought to capitalize on that fact in the favor of sanitarian advancement.[355] The General Assembly may have found itself convinced by Cooley's expertise but its members were most likely to have placed their faith in him from the beginning. Cooley seemed the most likely individual to accomplish that task. He sought to remind those who doubted the SDC's plans how much they stood to benefit from drainage and pronounced that the drainage project had "too much vitality, is too close to the needs of the people, to be killed off by any set of men. The great projects of the world have been carried out by their friends, and a mistake is made when such enterprises are entrusted to unfriendly and pessimistic agents."[356] Regardless of any and all committed resistance, the diversion of the Chicago River, supported by those whose professional

[354] Canal Commissioners of Illinois, *Report of the Canal Commissioners to the Governor: Delivered 1 December, 1895* (Springfield, IL: Er. F. Hartman State Printer, 1895), 10.
[355] Cooley, *The Lakes and Gulf Waterway: As Related to the Chicago Sanitary Problem-The General Project of a Waterway from Lake Michigan to the Gulf of Mexico*, vi.
[356] Ibid., viii.

expertise provided them the legitimacy to command such a project, garnered enough popularity to continue.

The support of the Illinois General Assembly, and Congress yielded the creation of the necessary sanitation infrastructure to administrate the reversal of the Chicago River. In the First Annual Meeting of the SDC, new president of the Board of Trustees, Richard Prendergast, outlined the intricacies of the agency's founding. A joint resolution of the Illinois State Senate and the House of Representatives created the SDC and provided the organization with jurisdiction in Chicago and along the Illinois River. Prendergast, reading the resolution stated that Illinois, "in order to procure the construction of a waterway" of "practical depth and usefulness for navigation from Lake Michigan by way of the Des Plaines and Illinois Rivers to the Mississippi River" afforded the SDC "propriety" in the City of Chicago, the Illinois River, and "its communities."[357] For the Federal Government, navigability, particularly for the transportation of warships, was essential for the support and approval of a full river reversal. The Illinois General Assembly also established clear parameters for the project at a flow of "300,000 cubic feet per second."[358] State leadership wanted to ensure that there was sufficient waterflow to dilute sewage for downstream communities and placate concerns from rural residents about coagulated sewage.[359] Federal support of the project hinged upon navigability, but that the Illinois state government and local communities would retain primary usage. Congress could not "interfere with its (the SDC) control" of the Illinois River and the sanitary canal, "for sanitary or drainage purposes."[360] The delicate balance of state and federal usage ultimately gave the SDC

[357] Board of Trustees of the Sanitary District of Chicago, "First Annual Meeting," 108.
[358] The Thirty-Sixth Illinois General Assembly, "The Illinois Waterways and Drainage Enabling Act, 4 June, 1889," 118.
[359] The Thirty-Sixth Illinois General Assembly, "The Farm Drainage District Dissolution Act, 4 June, 1889," *The Laws of the State of Illinois* (Springfield, IL: The Illinois General Assembly, H.W. Rokker, Printer and Binder, 1889), 117.
[360] Board of Trustees of the Sanitary District of Chicago, "First Annual Meeting," 109.

full authority to begin work on a drainage canal, but dilution, diversion, and river access continued to provide uncertainties for the project's viability.

Sanitation, however, remained scarcely mentioned in the official meeting minutes of the SDC's Board of Trustees. Instead, guidelines for military usage of the proposed sanitary canal garnered significant attention from the board members. Many legislators from the Mississippi River Valley, urged by their constituents, supported the canal only if certain drainage and navigability guidelines were met.[361] Despite concerns regarding the amount of sewage flowing downstream toward the Mississippi, Congress, eager to utilize a new canal for naval transportation and training, coalesced support from those in southwestern Illinois and eastern Missouri for Chicago's diversion.[362] According to Prendergast, Britain had constructed a "series of waterways between the (Great) Lakes and the Atlantic seaboard" capable of floating "over one hundred and twenty five war vessels" in the British arsenal. Those ships could then travel "from the British naval station at Halifax to the Great Lakes." The federal government, according to Prendergast, mentioned the construction of steel warships for the British defense of Canadian waters and that "it has been the policy of that government to foster the construction of steel vessels for commercial purposes….and use as armed cruisers in case of hostilities."[363] National defense of a "defenseless frontier," as Congress describe the Great Lakes region, prompted reluctant admission that despite the "diplomatic correspondence between the two countries," the densely populated northwest region of the country remained unprotected from a major foreign naval power with significantly greater access to ocean waters. Furthermore, Congressional leaders also invoked the Civil War and the defeat of the Southern Confederacy in its request for a

[361] "The Drainage Issue," *The Peoria Journal*, 10 June, 1889.
[362] Board of Trustees of the Sanitary District of Chicago, "First Annual Meeting," 109.
[363] Ibid., 110.

military channel. Without access to the Mississippi, which "broke the backbone of the Rebellion," the potential for Union victory would have remained less certain. Foreign and domestic threats, mostly perceived, influenced Congressional legislators' support for the diversion channel. Yet commercial opportunity also proved enticing. Congress and the Illinois General Assembly both agreed that a drainage canal remained necessary for sanitary, commercial, and military defense.

The Board of Trustees, in addition to the military defense benefits of a diversion channel, claimed that a reversal of the Chicago River would only enhance the state's financial prosperity. Prendergast noted that with "such a waterway," Illinois would remain the "Prairie State" and that it would additionally "become the manufacturing state par excellence of the continent."[364] Indeed, Prendergast and the Board of Trustees, founded largely by the members of Chicago's merchant class and the CAC, envisioned a "seat of water commerce." The lumber industry, already a massive contributor to the city's financial success and prosperity, stood poised to reap the benefits of a new canal linking the Illinois, Ohio, Missouri, and Mississippi watersheds. Chicago's commercial leadership believed wholeheartedly in the idea that a new sanitary canal would not only save Chicago's economic position in the Midwest, and the country, but would advance it. Sanitation threatened to unseat Chicago, whereas the reversal of the Chicago River showed the potential to save that financial prominence and even increase it. Prendergast continued by claiming that the "lumber of the North has heretofore been brought to Chicago, the greatest lumber market in the world." The reversal of the Chicago River, made possible by a new sanitary channel, would allow Chicago to make connections with the "lumber market of the continent." This "common waterway," so-called by the Board of Trustees, promised the potential

[364] Ibid., 111.

for not just Chicago's regional dominance but its national and international eminence.[365] Further promoting the Board of Trustees' nationalist vision, Prendergast proclaimed that the "cotton of the South will meet in the Illinois River Valley with the ores of the Lake Superior region, and both will be transformed from crude products to finished materials by the agency of cheap coal underlying the prairies of Illinois, and especially…the Illinois River valley."[366] Expectations, clearly outlined by Prendergast and his Board compatriots, remained high.

According to the Board of Trustees, the entire state of Illinois stood to benefit from the canal. Rather than simply frame the reversal as a boon for Chicago, the SDC had to convince rural residents that they too stood to benefit. The Board of Trustees promoted the drainage canal as an advantage that the entire state could use.[367] Considering the massive response that the CAC received in the years directly preceding the SDC's founding, the Board of Trustees knew that there remained significant support for the advancement of economic and sanitary conditions both in Chicago and in the surrounding area. Nonetheless, despite support from business and political leaders, concerns remained about wastes sent downstream through the Des Plaines River and a new drainage canal.[368] These concerns required added consolation through narrative of national commercial advancement and military defense from foreign threats in the Great Lakes region. Although Chicago's political and business leaders found agreement in Springfield, they had to tailor their arguments for a new drainage channel to accompany the concerns of rural residents in the Illinois River Valley.[369] This required careful political organization and rhetoric to obtain the

[365] "The Ship Canal," *Peoria Journal*, 29 January, 1889.
[366] Board of Trustees of the Sanitary District of Chicago, "First Annual Meeting," 111.; "Drainage and Ship Canal," *Peoria Journal*, 29 January, 1889. *The Peoria Journal* and the *Ottawa Plain-Dealer* published the official statements from the SDC's Board of Trustees. Coverage of the SDC's operations was near daily.
[367] Letter from Jasper M. Barker to John C. Ambler, (Chicago: Citizens' Association of Chicago Collection, August 29th, 1887), 2.
[368] "The Drainage Issue, *The Ottawa Plain-Dealer,* 29 January, 1889, 3.
[369] "Drainage to Come Up Again," *Peoria Journal*, 28 January, 1889, 2.

necessary support. Nevertheless, their attention remained committed to the removal of Chicago's industrial waste and the security of a cleaner, more marketable city.

Chicago's canal infrastructure offered attractive options for contending with the city's sewage removal problems. Although expensive and politically caustic, the drainage canal solution proved necessary, despite the SDC's attempts to avoid that decision. Indeed, the proposal to reverse the Chicago River using a larger sanitary canal, created enormous political conflict and financial concern. Ellis Chesbrough's attempts in the 1870s to improve Chicago's sewer system ultimately failed to divert the amount of wastewater necessary to provide the city's residents with the clean water they demanded. The solutions proposed during the mid-nineteenth century also emphasized the level of water pollution and its movement rather than sources. This suggested a lack of interest in regulating the industries that created and maintained Chicago's commercial prosperity. The Chicago Sanitary and Ship Canal (SSC), therefore, presented a unique challenge to the city's leadership, its engineers, and sanitarians: how to reform and improve Chicago's sanitation infrastructure, without disrupting financial interests. Construction of the SSC also revealed far more complicated local and regional concerns that transcended waste removal. Although successful in removing contaminated water from Chicago, and improving the city's water quality, the SSC left many sanitary problems, including the regulation of wastewater dumping, unresolved.[370]

The problem of sewage removal remained more complicated than simply deciding where refuse would go. Chesbrough, who led Chicago's Board of Sewerage Commissioners, before its dissolution, regarded sewage dilution a critical component of the city's sanitation plan.[371] Cooley

[370] "Chicago's Ship Canal," *Peoria Journal*, 2 February, 1889, 1.
[371] Lyman E. Cooley, *The Lakes and Gulf Waterway as Related to the Chicago Sanitary Problem*, iii. Referred to hereafter as the "Sewerage Board." Other names for the organization appear historically. This title remains in the narrative for brevity.

supported bacterial treatment of wastewater, which required a wide, deep canal, with a mechanically propelled current to facilitate aeration. Chesbrough had believed that Chicago needed both chemical treatment and a new drainage channel to improve its water quality.[372] Upon its incorporation in 1889, the SDC debated several options for sewage treatment and removal, despite lingering disagreement about how to execute both. These debates culminated in the SSC project, but it was Chesbrough's early work on both the Chicago Sewer System and at the Sewerage Board that laid the foundation for the SDC's reversal project.

SDC engineers engaged with bacterial solutions to sewage and waste dilution viewed as radical by their predecessors in the 1860s.[373] Chicago's engineers, many of whom began working with the Sewerage Board, borrowed most of the theories surrounding bacterial treatment of water from the German biologist Ferdinand Julius Cohn, who studied the interaction of bacteria within aquatic environments.[374] Cohn discovered and researched one such kind of bacterial organism, Micrococcus Cohn (M. Cohn), which SDC officials found in Chicago waterways. City scientists and engineers endeavored to defend against this bacterium and other contaminates through improved sanitation. The bacterium is harmful if consumed prior to cooking, causing significant gastro-intestinal problems.[375] The chemical treatment of the city's waste proved important to not only removing industrial refuse, but ensuring that it not remain a threat upon diversion.

---

[372] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 37.
[373] Daniel Schneider, *Hybrid Nature: Sewage Treatment and the Contradictions of the Industrial Ecosystem* (Cambridge, MA: The MIT Press, 2011), 30.
[374] W.W. Harman, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, 40. See also: Antoine Magnin, *Bacteria*, (New York: W. Wood and Company, 1884), 65. This book explains the classification of many of the various bacteria found in Chicago water ways during the nineteenth century, including M. Cohn. It can be accessed via Google Books.
[375] Magnin, *Bacteria*, 65.

M. Cohn, however, if aerated, can dissolve animal matter and other packinghouse refuse, which comprised the wastes in the Chicago River. Bacteria, needing the particulates to survive, multiply while moving through the water as they feed. Once these micro-organisms consume the remaining pollutants, they cease to reproduce, allowing for the dispersal of any bacterial life or wastes that exist in water. The SDC consulted the Sewerage Board's studies of M. Cohn and other bacterial agents that could potentially dilute Chicago's industrial wastes. Analyzing experiments conducted by the Royal University of Ireland, chemists, biologists, and engineers working for the Sewerage Board found that the amount of contaminates flowing through urban waters required large amounts of ammonia to decompose them. Oxygen provided by a current proved the most effective solution to this problem, through its availability, potential for reuse, and cost-effectiveness.

Chemical treatment, however, remained inadequate as the volume of sewage produced by the growing city still posed a significant threat to the viability of this process. The bacterial and chemical aeration process required a large volume of water to achieve effectiveness. SDC engineers theorized that aeration of sewage and wastes through a drainage canal, possibly the I&M Canal, would adequately move and degrade sewage without additional technology beyond the pumps already established near the city's center.[376] The plan was inexpensive, clean, and easy to operate. The slow current of the Chicago River, however, required additional propellants in the water to facilitate the introduction of oxygen needed for the disintegration of industrial pollutants.

City engineers assessed the effectiveness of three primary methods of sanitation available in the 1880s and the SDC considered the findings upon its incorporation in 1889. The first

[376] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 37-8.

involved the direct removal of wastes by discharge into an ocean, sea or other large body of water. The second plan sanitized water by intermittent infiltration or irrigation in various holding pools connected to a canal by pipes where operators would drain and clean the water. The third concept involved the actual chemical treatment of waters while simultaneously removing contaminants from polluted areas, expanding the amount of safe waters in those neighborhoods or towns. The SDC concluded that the slow-moving stream provided the most effective option when combined with a chemical water treatment.[377] Based on the studies in Ireland, the report concluded, "not only is this method of sewage disposal theoretically correct, but the results have been attained in practice."[378] Although these methods resulted in some positive results in European cities, the viability of this solution for Chicago remained uncertain.

The SDC justified its decision to facilitate an oxygen-based treatment of the Chicago River by highlighting the flaws of other sanitation methods. Moving effluents into a larger body of water seemed impractical for Chicago's situation. Lake Michigan provided drinking water, but also lacked the size and necessary current to dissipate contaminates sufficiently to produce potable water. Irrigation and filtration methods, with which the city loosely experimented in the 1860s and 1870s, also required cool air and soft soil to facilitate the proper disintegration of pollutants. Although many of Chicago's streets were unpaved, engineers imported dirt and sediment from outlying areas to execute this plan so as not to use materials needed for road maintenance.[379] Furthermore, Chicago's frigid winters inhibited riparian currents and yielded months of stagnation, thus increasing the potential for further contamination.[380] The SDC

[377] Magnin, *Bacteria*, 42.
[378] Ibid.
[379] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 42.
[380] Cooley, *The Lakes and Gulf Waterway as Related to the Chicago Sanitary Problem: A Preliminary Report, With Appendices, Maps, and Profiles*, iii.

grappled with an experimental solution involving sewage distribution to rural irrigation areas along the western and southern boundaries of the city. This experiment ultimately failed as farmers, wanting substantial harvests, often ignored the treatment and irrigation of sewage and sent the wastes to farms as fertilizer. Instead, wastes simply sat on the topsoil and contaminated surrounding crops. Losing money, many of the farmers dumped sewage into the Calumet River along the southern periphery of Chicago. Here, horse manure, industrial sewage, and other animal wastes sent to rural areas, matriculated back into the aquatic ecosystems surrounding the city.

The various attempts to address Chicago's sanitary situation often tried to both distribute water and purify it while industrial pollutants continued to pour into the lake. Pumps, tunnels, and drains all contributed to the city's infrastructure, and Chesbrough's sewer network drew national praise. The environmental situation, however, which included foul odors and contaminated drinking water, demanded that engineers find alternatives to the superficial methods adopted by civil agencies in the 1880s. Residents cited the continuing offensiveness of their living conditions, stating in a CAC report, "if present means are unsuccessful, a combined and vigorous effort of great extent, both in its character and its continuance, may be necessary."[381] Chesbrough's sewerage system, despite its relative novelty, largely failed to accommodate the rising population and the amount of waste produced by city factories. The SDC, therefore, began to examine the Chicago River itself and discussed methods for water purification and waste disposal.

Cost and complexity of the drainage canal project proved difficult to surpass. SDC leaders applied political pressure to compel the city's leadership to accept the canal plan. SDC

[381] *The Annual Report of the Citizens' Association of Chicago*, 13.

Board of Trustees president Richard Prendergast, organized a concentrated plan to attract support for the project from the Chicago City Council and business leaders. Prendergast claimed that former and some current city officials and industrialists were "unwilling to make radical changes in its methods," that included the complicated and expensive plans proposed by the SDC.[382] Dumping sewage into a waterway remained far more commercially attractive. In the SDC's proceedings, Prendergast documented a rising factionalism within the Chicago sanitation community. The factions that emerged advocated two different methods for dealing with Chicago's waste. The "Lake Party" argued for the continued dumping of sewage and industrial refuse in Lake Michigan, while the "Mississippi Party" suggested the diversion of pollutants through the I&M Canal.[383] "Lake Party" supporters cited dilution and sewage movement in the I&M Canal to generate support for a drainage channel. Although the SDC ultimately chose drainage to remove contaminates, historian Harold Platt states that civic leaders always regarded the lake as the final answer to sanitation issues.[384] Prendergast, and most of the SDC leadership, promoted the "Lake Party" and even adopted some of its findings and literature to support the case for a complete reversal.

Draining contaminated water was one issue but waste-removal demanded greater operator skill and more money. The seemingly unlimited amount of fresh lake water, combined with the belief in insurmountable sanitary crises, challenged leaders to seek a viable decision about industrial pollution.[385] The problem was also twofold: the city had to provide greater access to clean water, while removing sewage. Chemical water treatment involving the use of

[382] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, iv.
[383] Richard Prendergast, "Daily Proceedings," *Proceedings of the Board of Trustees of the Sanitary District of Chicago* (Chicago: City of Chicago Publishers, 1890), 267.
[384] Harold Platt, *Shock Cities*, 139.
[385] Ibid., 139.

soaps also appeared "impossible" according to the SDC report.[386] Therefore, water purification remained a vexing challenge. The complexity and expense of these options prompted many within the Chicago engineering and scientific communities to support the neutralization of sewage through dilution. Although the drainage canal garnered sporadic support from many Chicago sanitarians, researchers and civic leaders still grappled with waste elimination in addition to its removal from Lake Michigan. Prendergast, working with Cooley, moderated intense debates within the SDC leadership about the use of new dilution methods.[387] Many SDC engineers believed that a fabricated water current would provide enough bacterial dilution without additional chemical treatment. Prendergast and Cooley remained unconvinced. Indeed, Prendergast considered the potential opposition from downstream communities who would accept Chicago's waste and demanded greater water purification in anticipation of rural criticism. Whether chemical treatment proved viable was irrelevant to the political support from the state to advance the project.[388]

Chemical treatment of the Chicago River constituted the first step toward what would emerge as the SSC project. The idea began in the 1860s after a report, filed by Chesbrough for the Sewerage Commission, concluded that the river's "offensiveness," constituted the "chief pollution concern."[389] Initially, the SDC proposed two plans. The first involved a short canal, connecting a set of pumping works to the Chicago River to better move water and sewage through the city. This short canal would also provide the necessary chemical treatment by introducing ammonia and ammonia nitrate compounds from the aeration of M. Cohn. The

[386] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal,* iv.
[387] Prendergast, *First Annual Meeting of the Board of Trustees of the Sanitary District of Chicago*, "Proceedings," 267.
[388] Ibid., 268.
[389] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 63.

second proposal suggested that the summit of the I&M Canal be shortened and diverted to connect with a deeper channel cut through the Mud and Des Plaines Rivers. The SDC ordered its engineers to compile additional information on each recommendation. They found that without purification or an engineered current, any alteration to either the I&M Canal, or the feeding rivers and Lake Michigan, would render the project ineffective. Should the City Council approve a drainage canal for Chicago, the SDC would have to maintain its navigability. Therefore, when waters froze during the winter months, pumps would need to propel the river's current to adequately divert sewage away from the city while simultaneously treating it.[390]

Filtration and treatment of the Chicago River proved a highly complicated endeavor. Many of the mechanisms central to the successful operation of the SSC, however, including pumping works near the Bridgeport neighborhood on the city's south side, originated with the initial purification efforts of the late 1860s. The SDC mandated that the canal be navigable for commercial use, while also carrying water away from the city.[391] At two miles long and fourteen feet deep, the SSC would serve a dual purpose in providing transportation in and out of the city, as well as a conduit through which engineers could carry and treat wastes.[392] During the project's planning phase, engineers also sought to connect the canal with the city's sewer system for more efficient waste water treatment and disposal. The canal's primary purpose, described often by the SDC, was the "disposal of contaminants from industrial operations in the city's southern division."[393] The SDC remained clear in its designation of the contaminated Chicago River as the primary threat to public health, stating that "while the sewers were responsible to some

[390] W.M. Harman, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, "Proceedings," City of Chicago, 8, December, 1891, 295. These transcripts of the SDC's meetings and weekly activities can be accessed, in their original printed form, at the Harold Washington Library Center in the Municipal Records collection of the Government Information division.
[391] *History of the Chicago Sanitary and Ship Canal*, 88.
[392] Harman, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, "Proceedings," 297.
[393] Ibid., 298.

extent, the pollution was chargeable chiefly to the slaughter and packing-houses in and around the city, besides from that, distilleries, glue factories, establishments for rendering offal, etc."[394] City officials, the SDC, and engineers argued for water filtration as a chief component of a more comprehensive sanitary system.

Proposed in 1889, the SSC would extend forty miles between the South Side of Chicago and the town of Joliet. Initial funding for the project came from the City of Chicago and adjoining townships through government bonds and private donations. The Northern Trust Company of Chicago, who saw a long-term commercial benefit to creating a healthier city, donated some of the most of any private entity.[395] SDC reports and meeting minutes detailed the response garnered by the SSC project, stating that "no public question relating to the physical improvement of the country, ever received closer or more prolonged attention."[396] Early stages of construction involved the dredging of the Continental Divide to Chicago's west. In addition to geological surveys, the SDC ordered laborers to begin digging through the clay, bedrock, and gravel on the riverbed to initiate the dredging process. Downstream, surveyors assessed the topography of the Des Plaines River valley concluding that the surrounding hillside required excavation to assist in a reversal of the river's flow.[397] Engineers adjusted the canal depth to alter the speed of the water current. Deeper sections of the canal allowed for a faster current, whereas more shallow areas would decrease water flow. Thus, the entire project relied upon the

[394] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 66.
[395] Chas Baly, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, "First Regular Meeting" (Chicago: City of Chicago, Publishers, 2 February, 1890), 8. The City of Chicago published records of the meetings of the Sanitary District that is bounded and held in Government Information at the Harold Washington Library in Chicago, Illinois. This volume details the organization of the Sanitary District and the formative measures taken to begin work on the Drainage Canal.
[396] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, iv.
[397] Ibid., 96.

manipulation and alteration of the landscape, whether on the river floor, or along the surrounding hillside.

The SDC later issued a history of the SSC in 1924, describing the specific natural conditions that made Chicago a preeminent American city, but that also contributed to many of its ecological problems.[398] The SDC likely released its report to explain the ecological situation of the city and justify the methods used to remedy the environmental and public health crises their fellow citizens faced. According to historian Harold Platt, civic leaders often took credit for even marginal successes.[399] For city leaders, the manipulation of a river system, for the public good, constituted a resounding achievement.[400] Sanitary projects, including the reversal of the Chicago River reflected the Progressive ideals of a tamed nature, regulation, and commitment to public service. The management of natural resources, through the solidification of centralized state authority, offered what the city's reformers believed to be the most desirable solutions to a vexing sanitary crisis.[401]

Throughout the nineteenth century, and even into the twentieth, civic leaders and businessmen still used advertising and boosters to draw in new commercial prospects and investments.[402] The report chronicles the canal's construction and the reasoning employed by engineers and SDC officials, but also reveals civic leaders' notions about the environment. For

---

[398] Ibid., iii. This history described the development of Chicago, its industries, and the emergence of the sanitation challenges that confronted the SDC. Within this narrative, the District illustrated the reasoning behind many of their decisions and justified the methods and plans they adopted. While a comprehensive history, its accuracy must be questioned, however lightly, as the purpose for the narrative likely involved a defense of the SDC's actions. Therefore, this chapter uses secondary accounts of the Drainage Canal to balance the narrative of the SDC.
[399] Platt, *Shock Cities*, 136.
[400] "Anniversary of the Drainage Canal," *The Chicago Daily Tribune*, 3 August, 1895, 3.
[401] See: Carl Smith, *City Water, City Life: Water and the Infrastructure of Ideas in Urbanizing Philadelphia, Boston, and Chicago* (Chicago: University of Chicago Press, 2013). Here, Smith provides an intellectual and cultural history of water management in Boston, Philadelphia, and Chicago during the nineteenth century. Smith emphasizes the reforms of Progressive-Era leaders and how they viewed the city and nature.
[402] Platt, *Shock Cities*, 136

many in Chicago's government and sanitation community, Lake Michigan offered not only the most effective repository for industrial wastes and sewage but represented the immensity of nature and the ecological challenges facing the city.[403] The report describes Chicago's unique situation and the complex challenges that faced reformers. As planning for the project progressed, SDC leaders continually emphasized the commercial benefits of the SSC, both for the city and downstream communities. Congressional and military support also offered compelling evidence for the project's relevance.[404] Officials within the War Department wanted to ensure a means of defense for the Great Lakes region during a potential invasion, and the river systems in the area.[405] In the project's early days, the SDC largely cited political pressure as the primary impetus for seeking an answer to the city's dilemma. Military support for the project allowed the SDC to procure funding to finance the project and to further justify such an enormous endeavor.

Although Chicago remained a financial capital in the then-western portion of the country, largely because of its adequate portages and proximity to Lake Michigan, the idea for a canal to serve Chicago only emerged to construct another means of travel and trade. Construction of a canal to address sanitation, as a concept, did not arise until industrialization, after the condition of the city's environment degraded beyond tolerance. Upon completion of the project, the SSC improved water quality and provided an important commercial shipping route.

As industrial pollution increased in the Chicago River and Lake Michigan, City Council and SDC officials discovered that the problem required more complex waste dilution methods rather than simple removal. The exponential rate at which meat-packing companies deposited

[403] Ibid., 138.
[404] Richard Prendergast, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, "Daily Proceedings" (Chicago: City of Chicago Publishers, 11 July, 1890), 22.
[405] Board of Trustees of the Sanitary District of Chicago, "First Regular Meeting," 111.

blood and animal carcasses into the river demanded that the city address not only where contaminated water went, but its threat to human health. Public pressure and financial constraints complicated the SDC's ability to address the issue, and methods ranged from irrigation and filtration to lakeside pumps. None of these methods, however, successfully balanced the need to address environmental degradation and citizens' access to clean drinking water with protecting business interests. Although the Chicago River flowed into Lake Michigan, the SDC moved to further manipulate the landscape, devising one last technological advancement that reversed a river while fashioning a new weapon in the struggle against urban pollution. By 1900, the Chicago River was a mechanized, open sewer.

Conclusion

The formation of the SDC represented the legal union of the State of Illinois and Chicago. In practice, however, the agency represented more sweeping action. The SDC's commitment to river diversion reflected regional support for improvement of Chicago's sanitation. The SSC sought to not only improve water quality, but to also provide rural communities with waterfront access and convenient commercial shipping. Traffic, which promised to increase all along the Mississippi River, would extend from New Orleans to the Great Lakes. Cities and towns located on the new shipping route created by the new SSC, offered opportunities for greater economic exchange and growth. Municipalities previously isolated and beholden to intermittent shipping traffic, could benefit from a larger waterway that would connect the nation's fastest-growing city with their waterfront operations. The monetary benefits, therefore, outweighed the sanitary concerns that previously worried so many of Illinois's rural residents.[406] Commercial control of that sanitary diversion promised to offer, framed many of the

[406] *The Chicago Daily Tribune*, "Joliet Wants the Drainage Channel," 11 April, 1889, 1.

discussions following the SSC's introduction. Although the SDC faced continued legal opposition during their efforts to realize the drainage channel plan, commercial development and prosperity, seemingly reserved only for Chicago, now convinced others in the region to support the canal.

Although the SDC had developed plans for a drainage channel, funding and logistics remained difficult to secure. The SSC's construction process began in 1891, but political wrangling and legal challenges presented stout obstacles to progress. Nonetheless, the SDC, and its associated political support from the CAC, represented cooperation and organization that could withstand any remaining opposition. Drainage of Chicago's waste, as made evident by the SSC plans, were first among the concerns of the region's commercial, engineering, and public health leaders. Continued opposition from downstream communities, not to waste diversion, but to commercial disadvantage, shifted debates from sanitation, at least in Central Illinois, toward a share of the economic prosperity promised by Chicago's new drainage channel.[407] Although polluted water threatened the health of an entire state, the SSC project incited conflict about financial dominance and a share of profits generated by a new riparian highway. As Cooley stated in his report, the "Chicago drainage and waterway project has too much vitality, is too close to the needs of the people, to be killed off by any set of men…a mistake is made when such enterprises are entrusted to unfriendly and pessimistic agents."[408] The SSC would build a defense of industry masked as sanitary reform.

[407] *The Chicago Daily Tribune*, "The Illinois Valley Anti-Chicago Convention," 7 April, 1891, 1.
[408] Cooley, *The Lakes and Gulf Waterway as Related to the Chicago Sanitary Problem: A Preliminary Report, With Appendices, Maps, and Profiles*, viii.

Chapter IV: Construction and Social Control, 1890-1892

The establishment of the Sanitary District of Chicago (SDC) proved controversial. Communities along the Illinois River viewed the consolidation of public drainage and sanitary agencies with skepticism. With respect to pollution in the Chicago River, the creation of the SDC by the Illinois General Assembly represented a capitulation to Chicago's interests at the expense of Illinois River Valley residents.[409] The Illinois River towns of Peoria and Ottawa, both of which coordinated significant resistance to a potential reversal of the Chicago River during the 1880s, remained important opponents to further progress on the "diversion" plan.[410] Lyman Edgar Cooley argued forcefully for a reversal upon the passage of the Sanitary District Enabling Act in 1889. He continued an engineering tradition established by Ellis Chesbrough nearly twenty years earlier. Chesbrough's support of diversion garnered interest from Chicago merchants, lawyers, and affluent residents within the Citizens' Association of Chicago (CAC). Cooley stood determined to fulfill Chesbrough's vision and satisfy Chicagoans who favored a business-friendly solution to the city's sanitation crisis. Ironically, the diversion plan fetched a massive price tag of over $20,000,000.[411] Rural Illinoisans grew concerned that reversal would come at the expense of their economic standing. If Chicago's engineers were to the city's waste

[409] "Our Waterway," *Peoria Journal*, 12 December, 1888, 2. The Abraham Lincoln Presidential Library in Springfield, IL has an impressive collection of rural newspapers throughout the state of Illinois. It was there that these newspaper articles may be found. Hereafter, the chapter maintains the name "*Journal*" when referencing the *Peoria Journal* newspaper.
[410] "Diversion" is the historical term used in print media, engineering reports, and meeting minutes to reference a potential reversal of the Chicago River.
[411] "Our Waterway," *Peoria Journal*, 3.

downstream toward towns including Peoria and Ottawa, then financial compensation seemed only fair.[412]

Illinois River Valley residents, who lived in the flow of Chicago's wastes, used their local printed media to resist what they saw as an economic coup by Chicago's politicians, industrialists, and civil servants. Central Illinois newspapers often referred to the drainage plan as a "scheme devised by those with a vested interest in Springfield and Chicago."[413] Diversion discussions amongst affluent CAC members and Chicago's engineers, proceeded intellectually and largely ignored local concerns. Residents most vulnerable to industrial pollution most fiercely doubted technocrats' intentions. In contrast to public engineers who preceded him, however, Cooley wielded the power of the SDC to defend technocratic legitimacy against such opposition. A political bureaucrat, he strategically conceded some demands from rural opponents to ensure that the larger reversal project moved forward. The result was a regional commercial agreement that cemented the diversion plan as a financially lucrative enterprise that benefitted Illinois' economic vitality in the name of improved sanitation. Technocratic experts, Cooley among them, emerged as the individuals most prepared and justified in regulating a polluted environment and private enterprise. Although that rise met concerted opposition, rural and urban Illinoisans soon accepted Chicago's technocracy as good for business. Chicago gained a new transportation and sanitary system that secured a predictable trajectory of economic growth defended and managed by the city's public sanitation bureaucracy.

"Downstate" Dissent

[412] "Drainage Debate," *The Ottawa Plain Dealer*, 1 February, 1890, 2. Copies of the Ottawa Plain Dealer are also available on microfilm at the Lincoln Presidential Library in Springfield.
[413] "Debates about the Drainage Scheme: Springfield and Chicago on Board," *Peoria Journal*, 22 January, 1890, 3.

As industrial pollution flowed through the Chicago River toward Lake Michigan, the City Council and the newly-formed SDC discovered that the problem required the dilution of wastes rather just their removal.[414] A concept familiar to the city's engineers since the 1850s, dilution involved either the chemical or mechanical degradation of solid waste-matter in water. Mechanical dilution, often also called aeration, proved a more popular waste-treatment strategy for many of the country's sanitarians. This process emerged as a bargaining chip in diversion debates with rural Illinoisans. Many opponents of the drainage plan sought assurances from the SDC that wastes, flowing toward them, would receive treatment. Rural communities had expressed concerns about diversion when the concept was first explored by the CAC in 1885.[415] The exponential rate at which meat-packing companies deposited blood and animal carcasses into the river demanded that the city address not only where contaminated water went, but its sanitary condition. Public pressure and financial constraints complicated the SDC's ability to address the issue, and many methods ranging from irrigation and filtration to lakeside pumps, attracted significant consideration from engineers and politicians. None of these methods balanced citizens' access to clean drinking water with protecting the city's financial solvency.[416] Although the Chicago River flowed into Lake Michigan, the SDC moved to further alter the landscape, devising one last technological advancement that would reverse a river while fashioning a new weapon in the struggle against urban pollution.

---

[414] Lyman E. Cooley, *The Lakes and Gulf Waterway: As Related to the Chicago Sanitary Problem-The General Project of a Waterway from Lake Michigan to the Gulf of Mexico: In Respect to the Chicago Terminus, Physical Features of the Route, Character of the Project, its Utility, and the Methods of its Accomplishment-A Preliminary Report with Appendices, Maps, and Profiles* (Chicago: Press of John W. Preston, 1888), iv. This pamphlet is archived at several universities, including Harvard. A digital copy is accessible via hathitrust.org. Cooley's piece remained the primary argument for the SSC throughout the SDC's formative years, between 1889 and 1900.
[415] Letter from James H. Wilson to Main Drainage Committee of Chicago (Chicago: Citizens' Association of Chicago, April 25th, 1888), 2.
[416] The Citizens Association of Chicago, Water and Sewage Committee, "Drainage," *Minutes of the Citizens Association of Chicago General Meetings* (Chicago: Hazlett and Reed Publishers, 1881), 43.

Illinois state lawmakers and SDC officials held high expectations for their bold sanitation strategy. Should diversion work, the proposed Chicago Sanitary and Ship Canal (SSC) would divert wastes away from Chicago and Lake Michigan permanently. Civic leaders sought a resounding sanitation victory. Success, from a municipal perspective, involved improved drinking water but also the celebration of public servants. The resulting political conflict reflected the social, economic, and environmental insecurities of both Chicago and rural partners. Without the support of town and country, the SDC's operations stalled. Frustration grew within the General Assembly and on the SDC's Board of Trustees at the political stalemate.

Chicago's engineering community had to satisfy varying constituent interests. To build favor for reversal, the former Board of Sewerage Commissioners, and later the SDC, ordered research of Chicago's air and water quality. These studies also examined how refuse permeated Chicago's surrounding riparian ecology. Upon learning this information, the CAC and the Chicago City Council strengthened their support for drainage as a viable sanitation strategy. Having petitioned City Hall, many local and national business-leaders, including the Atchison, Topeka, and Santa Fe Railroad (AT&SF) also found drainage attractive. Such a channel would provide cheap, efficient waste-disposal and convenient transportation.[417] The river reversal plan also required the construction of a wider, deeper waterway that could accommodate larger shipping vessels. Many industrialists, including Armour, Swift, and the AT&SF, welcomed the possibility of more efficient transportation.[418] The lure of higher traffic and commensurate toll revenue secured the favor of central Illinois. Water-quality studies, ordered by the General Assembly, jeopardized the rural residents' support of drainage. The extent of the Chicago

[417] Chicago Common Council, *Journal of the Proceedings of the Chicago Common Council*, "Minutes of June 25th, 1888" (Chicago: City of Chicago Publishing, 1888), 221. The minutes of the Chicago Common Council are archived at the University of Illinois- Urbana-Champaign. They are also available in digital form via hathitrust.org.
[418] Cooley, *Lakes and Gulf Waterways*, 10.

River's contamination meant that the city's technocratic leadership seemed prepared to send industrial refuse and poor water quality to central Illinois. As distressing as downstream wastes seemed to many Illinois Valley towns, others remained committed. Nonetheless, inconsistencies in rural support endangered the proposed reversal project and slowed work on the canal.

Congressional approval for the reversal construction tied the SDC and the broader diversion project to national interests. The canal would accommodate both warships and commercial vessels, in effect, supplanting the region's natural river system.[419] Federal support and obligations to the U.S. government also attracted national media coverage and scrutiny. Given the intensity of past attention to the SDC in Chicago's newspapers, this prospect only complicated the situation. Downstate opposition to the reversal project, particularly in the *Peoria Journal*, contended that national attention belied ulterior motives by the city's technocratic professionals. Rather than transparency, Central Illinois opponents concluded that the "drainage board engaged in most underhanded tactics" and represented a "direct threat to the interests of residents in the Illinois River Valley."[420] Central Illinois criticism of the reversal project only intensified as the plans progressed, and the close cooperation with federal officials did not comfort diversion opponents already skeptical of the planners' intentions.

Opposition from Central Illinois proved challenging enough without the complexity of the reversal plan itself. The drainage channel, which promised to be the largest and most consequential earth-moving project in the country to date, required drawing water from other rivers to assist its operation. Although engineers used water from the Chicago River South Branch to generate the current necessary for reversal, the SDC built additional channels that connected the far northern section of the Chicago River North Branch at Wilmette where a major

[419] Cooley, *Lakes and Gulf Waterways*, 1889, 95-8.
[420] "Debates about the Drainage Scheme," *Peoria Journal*, 3.

pumping station sent cleaner water south toward the drainage canal.[421]



Figure 7: The Sanitary District of Chicago, "Map of the Sanitary District of Chicago Showing Sewage Treatment Projects," (Chicago, City of Chicago Publishers, 1919). The solid line shows the North Shore Channel to Lake Michigan. This connected the North Branch of the Chicago River with the lake. Map courtesy of the Newberry Library, Chicago.

[421] Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal* (Chicago: City of Chicago Publishers, 1924), 220.

This channel, charted in the map above, also diverted the flow of the North Branch, improving the less-polluted waters of the city's northern section.[422] Contamination in the Chicago River North Branch, although problematic, remained far less troubling than the situation in the South Branch. CAC activism (the organization's leadership lived on the North Side), produced results for affluent neighborhoods.[423] Pumping stations, including one at Evanston, pictured in the map, assisted in the North Channel's diversion. The agency's area of operations, which mostly included Chicago city limits, appear outlined in bright yellow on the map. SDC mapping, including in the above example, reveals the agency's narrowed focus on Chicago's sanitary concerns. Despite operating as a state agency, the SDC fixated on a diversion strategy that served the city's commercial endeavors. Although public statements released by the agency's leadership acknowledged rural opposition and demands, their specific projects in Chicago reveal more localized concerns.

Despite expended SDC time and resources on the North Shore Channel, the main event remained south. Originally, the Illinois and Michigan (I&M) Canal connected the Des Plaines River with the much shorter Chicago River, allowing the SDC to divert river water toward the SSC. The I&M canal's positioning, however, dictated where the SDC could dredge and what route the drainage canal could take. Cooley, who had replaced Ellis Chesbrough as Chief Engineer of the Chicago Board of Sewerage Commissioners, concluded that water from the I&M could also assist in deepening the drainage canal. Rather than dig around the I&M canal, the

[422] Sanitary District of Chicago, "North Branch Drainage Channel: For the Diversion of 32,000 CFS at Wilmette," *Report to the Board of Trustees of the Sanitary District of Chicago on North Branch Drainage* (Chicago: Hazlett and Reed Publishers, Sanitary District of Chicago, 1899), 1-2.; Sanitary District of Chicago *History of the Chicago Sanitary and Ship Canal*, 221-223.; Sanitary District of Chicago, "Map of the Sanitary District of Chicago Showing the Sewage Treatment Projects" (Chicago, City of Chicago Publishers, 1919).
[423] *The Citizens' Association of Chicago*, "North Shore Drainage" (Chicago: Hazlett and Reed Printers, August,1880), 34. Board members' contact information appears prior to meeting discussions.

Board of Trustees, at Cooley's suggestion, decided to build sections of the SSC on top of the I&M canal.[424]

Given the directional flow of the Chicago River and the I&M canal, Chicago's geography also complicated the diversion project. Preparation to build the SSC had lasted a decade, a process led first by the Chicago Board of Sewerage Commissioners and the Illinois State Board of Health until the SDC's incorporation in 1889.[425] SDC Chief Engineer Lyman E. Cooley decided that the first stage of the SSC's construction was to dredge the Calumet, Des Plaines, and Kankakee Rivers.[426]

The SDC's plans for these rivers relied on geographical research and regional history. A line of ridges along Chicago's western perimeter constituted the area's subcontinental divide and created the original flow of the Chicago River. The construction of the SSC required dredging to tip the water flow from Lake Michigan toward the Des Plaines River. The SDC relied on analyses of these geographic features that the Board of Sewerage had developed in creating its diversion plan. Detailed knowledge of the area's rivers proved necessary as their waters would contribute to the SSC's own supply. The SDC's post-construction report, published in 1924, discusses its use of journals kept by the French-Canadian explorer Louis Jolliet and the French-Jesuit missionary Jacques Marquette. Indigenous peoples long understood the area's riparian

---

[424] Richard Prendergast, Proceedings of the Board of Trustees of the Sanitary District of Chicago "Daily Proceedings 7 December, 1890" (Chicago: City of Chicago Publishers, 1890), 27.

[425] Illinois Board of Sewerage Commissioners, "Meeting of 12 December, 1896," *Proceedings of the Illinois Board of Sewerage Commissioners* (Springfield, IL: Illinois State Archives, 1896), 1-3. Transcripts of the Illinois Board of Sewerage Commissioners Board of Trustees' meetings are available on microfilm at the Illinois State Archives in Springfield.

[426] Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal*., 98.: The Sanitary District of Chicago, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, "Daily Proceedings," 12 November, 1891, 263. Reporting to Richard Prendergast, the chairman of the Sanitary District's Board of Trustees Chairman, Cooley documented all elements of the construction process. The Board, composed of sanitarians, businessmen, and local politicians, needed as much information as possible so that it could allocate resources accordingly, while the Board of Sewerage Trustees, the Canal Trustees Board, and the Law Enforcement Board completed the legal organization for the project.

ecology even in European colonial traders could not decipher their mapping. Through contact with Native communities, French traders improved their surveys of the Great Lakes. Fur-Trade maps were particularly useful in contextualizing those aspects of the geography untouched by the I&M Canal, including river depths and land elevation.[427]

The SDC's formation afforded the CAC tremendous political influence. Creation of a state agency devoted to sanitation was an idea advanced by CAC leaders nearly twenty years earlier. By supporting sanitation causes, long-serving president Murry Nelson and other CAC activists pressured civic officials to act quickly in realizing the public's "dream" of clean drinking water, although it took years for government action.[428] A chapter within the SDC's report entitled "The Work of the Chicago Citizen's Association" captured this entity's power while suggesting the importance of organized citizen responses in building the SSC.[429] The CAC believed that the project represented an opportunity to remedy the city's sanitary problems, but "residents to the south and west" of the city "expressed doubt."[430] SDC leadership on its Board of Trustees discussed the need for proper waste-dilution given Downstate concerns about the flow of sewage and refuse.[431]

The Illinois State Board of Health: Its Findings and Influence

Utilizing Chesbrough's earlier studies and its own findings, the SDC concluded that the river water required treatment, ensuring that industrial wastes would not contaminate water in the Illinois and Mississippi Rivers downstream. Before finalizing the canal plan, the SDC collected

[427] Ibid., 102.
[428] *Citizens' Association of Chicago*, "Main Drainage" (Chicago: Hazlett and Reed Printers, November, 1881), 15. All of these transcripts can be found in either their original printed form, or in photocopied publications at the Harold Washington Library Center in its Municipal Records collection in the Government Information division.
[429] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 336.
[430] *Citizens' Association of Chicago*, "Main Drainage," 16.
[431] Ibid., 17.

bacterial data from other rivers to compare with the Chicago River.[432] The SDC also analyzed ammonia levels in the river to determine the appropriate response to pollution. Engineers deemed ammonia treatment of water an impractical solution as the rate of contamination far outpaced the SDC's ability to apply chemical treatments. Furthermore, a standard for analyzing water contamination in the 1880s did not exist. Therefore, upon its founding, the SDC examined water sources in areas adjacent to the river to analyze water composition, chemically, relative to the actual amount of pollution in the river.[433] Engineers found this data critical not only for the canal's construction but for the treatment mechanisms accompanying it.

The SDC also investigated the practices of the State Boards of Health in both Massachusetts and Connecticut to frame their analyses. It chose these states as many rivers there flowed from lakes with similar ecologies to Lake Michigan. The Connecticut State Board of Health published the findings of its water analyses in its *Fourteenth Annual Report* in 1892, which the SDC used to determine whether the Connecticut State Board of Health was effective in its practices. Ultimately, the report showed that lake waters in Connecticut resembled waters in Lake Michigan despite various vegetative differences.[434] The state of Connecticut provided the tools and researchers needed to analyze water in the Chicago River and Lake Michigan. The Connecticut State Board of Health found that Lake Michigan's water had a "decidedly greenish tinge," and discovered more than 100,000,000 living bacterial organisms harmful to human health.[435] Although pure upon first inspection, when pumped from a hydrant the water from Lake

[432] Harman, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, "Proceedings," 297.
[433] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 18.
[434] Ibid., 18; and John H. Rauch M.D., *Fourteenth Annual Report* of the State Board of Health of Connecticut, 1886.; Cited in: *History of the Chicago Sanitary and Ship Canal*.
[435] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 18-9.

Michigan was "highly polluted."[436] These tests allowed the SDC to assess the actual pollution encountered by Chicago residents in their drinking water.

During analyses of the Chicago River, the SDC found that the summers of 1885 and 1886 yielded the highest amount of river pollution. Dr. John H. Long of the Illinois State Board of Health and a faculty member of the Illinois Medical College, assessed the water from one single hydrant every Saturday during the two- year span.[437] Long published his findings in the *Ninth Annual Report of the Illinois State Board of Health* and reached similar conclusions to the Connecticut State Board of Health. In conjunction with the Connecticut study of water from the initial hydrant, which discovered nearly 100,000 bacterial organisms in one glass of water, Long also assessed the water level of the Chicago River near Bridgeport on the city's South Side. Considering factors including rainfall, temperature, and water current, Long found no connection between these variables and river pollution. Long broadened his study to include Lakeview and Evanston water supplies and found that similar conditions existed there along with waters in the Des Plaines River at Joliet and the Illinois River at Ottawa and Peoria.

In all, the SDC authorized 152 chemical analyses and 880 water level measurements.[438] The purpose of this comparison was to highlight the extent of water pollution in the Chicago River and Lake Michigan, and to see if methods used in Connecticut could prove useful for Chicago. Although difficult to determine, it may also be possible that the comparison served to deflect criticism of Chicago's sanitation situation and of those charged with managing it. Ultimately, engineers and scientists working for the SDC concluded that the problems demanded an entire overhaul of the Chicago River.

[436] Ibid., 19.
[437] Ibid., 19.
[438] Ibid., 20.

Secretary of the Illinois State Board of Health, Dr. John H. Rauch, studied the water quality in Chicago for about 10 years, and observed that the conditions of water in the Chicago River and Lake Michigan were "particularly bad" during the period between 1885 and 1886.[439] The 1885 Flood caused the Chicago River to overflow, especially at the Ogden-Wentworth ditch near Bridgeport. Flood waters carried sewage, animal waste, and other industrial pollutants into sources of Chicago's drinking water. Much of this pollution originated from the South Fork of the South Branch of the Chicago River a popular disposal site for the meat-packing and glue factories in the area.[440] With large amounts of rainfall in the city between August 4 and 11, the Des Plaines River flowed freely into the South Branch of the Chicago River. Combined with the stifling summer heat, the conditions became particularly unbearable and degraded to a "more offensive condition than any time since."[441]

The effluent from both the Des Plaines and Chicago Rivers poured into the city for over a month prior to the start of these tests. Therefore, the samples reflected the pollution of both the river and the lake at its worst.[442] SDC scientists compared these waters with those from Hartford, Connecticut in the same year. The Hartford samples, the comparative framework for Chicago's water, displayed a higher level of pollution than what the Illinois State Board of Health observed during the summer of 1885.[443] Much of the water involved in the Hartford study flowed from small streams and creeks six miles outside of the city in dense, wooded areas. It was also a city

[439] "The Public Health: The Secretary's Report to the State Board on Epidemic Diseases-The South Fork Sewerage," *The Chicago Daily Tribune*, The 4 July, 1885, 1.
[440] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 20. The South Fork of the Chicago River-South Branch is also more commonly known as "Bubbly Creek," made infamous by Upton Sinclair's novel *The Jungle*.
[441] Ibid., 20.
[442] Ibid., 21.
[443] "The Public Health: The Secretary's Report to the State Board on Epidemic Diseases-The South Fork Sewerage," *The Chicago Daily Tribune*, 4 July, 1885, 1.

of 53,000 in 1885, compared to Chicago's population of more than 1,000,000.[444] The water administered by the SDC was urban water that directly affected hundreds of thousands of people, many of whom lived down stream or in the city's South Side working-class communities.

The dire sanitary situation persisted in Chicago. Pumps installed along the South Branch of the river struggled to accommodate water flowing into the city and Lake Michigan during periods of heavy precipitation. Pollutants went untreated. Civil engineers momentarily stopped the pumps during floods, allowing the water and its contents to coagulate further in affected areas of the city. It was in these situations that sanitarians collected their best samples. During this time, Chicago imported water to replace the potable sources lost as a result of contamination or examination.[445] The SDC found that water imported into the city also contained pollutants, thus eliminating the option of combining Chicago's water with outside sources. Armed with a year of biological data, collected by both the Illinois State Board of Health and the Connecticut State Board of Health, the SDC could support its claim for a new sanitary canal.

Upon founding of the SDC, the Board of Trustees President, Richard Prendergast, immediately confronted a public relations nightmare in the extent of the city's sanitation crisis and how it would affect Illinois River Valley communities upon reversal. Several rural newspapers printed Rauch's data for public viewing. The *Journal* published the data contained in Rauch's findings, which many of its journalists concluded was further proof that Chicago's drainage proposals were dangerous. Central Illinoisans, *Journal* staff writers concluded, would face the worst of Chicago's economic prominence.

Readers' letters continued to flood the *Journal's* printing offices. While increased shipping revenue and infrastructure were attractive outcomes of such a project, print media in the

[444] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 23.
[445] Ibid., 24-5.

Illinois River Valley illustrated the pollution as a threat that would completely overwhelm the potential benefits of a drainage channel system. According to an article dated Monday, January 28, 1889, "slaughterhouse refuse, and all of the noisome offscourings of distilleries flow unrestrainedly into the river and the amount of poisonous free ammonia is at once tripled."[446] Based on this reporting, the SDC gravely underestimated both the amount of sewage that would flow out of the city and the efforts required to ensure its readiness for drainage. Although Rauch worked for the State of Illinois, the *Journal* was unsure how his research would be employed by the SDC and the City of Chicago. Despite Rauch's concerning conclusions, the SDC appeared committed to continuing the project as planned. Threats of Chicago River wastes and the difficulties present in diluting that sewage, as represented by the Board of Health, proved an untenable situation to rural communities promised protection from such pollution. At best, the SDC appeared negligent in its appraisals of Chicago's sanitary crisis. The *Journal* article continued by stating that there was "little doubt of the possible advantages available to Chicago's opponents that the Board of Health's report presents." SDC leaders hoped that Rauch's studies would provide further justification for the drainage canal. Instead, his reports served merely to increase tensions in rural communities.

SDC leadership did not take the *Journal*'s criticisms kindly. Board of Trustees President Richard Prendergast himself penned several responses to the valley's charges, publishing them in the source: the *Journal*. Prendergast claimed that the SDC, the General Assembly, and Chicago's City Hall all held the "best interests of Chicago, the valley, and the waterway" in their actions. Prendergast proclaimed that the criticisms rendered by the *Journal* and those in valley communities, were "fomented by intriguers and plotters whose schemes have been defeated thus

[446] "Drainage Channel," *Peoria Journal*, 28 January, 1889, 1.

far."[447] In response to growing concerns surrounding Board of Health studies, Prendergast stated that all actions taken by the SDC were in "correspondence with the law." State law also governed the Board of Health's assessments, Prendergast stated, and that the SDC was "honestly doing the work according to those provisions; the law as indicated will be carried out in good faith." The SDC president continued to use the law to shield his agency from any actions perceived as oppositional to rural interests. Prendergast urged the *Journal*, and other regional media outlets to "judge us by what we have done and not by what others have said, are saying, or will say about us."[448] Prendergast understood the obstacle posed by negative press to SDC progress. He also recognized the political implications of opposition from Illinois Valley residents. Rural support remained crucial to advance the drainage project. Concessions to rural opposition proved necessary.

The *Journal*'s readers and editors remained skeptical about Prendergast's proclamations of good faith. Legal protections may have allowed the SDC to proceed in the way it did, up to a point, but rural writers wondered if those laws served only to defend urban wealth at the expense of the valley's economic and environmental security. In response to Prendergast, the *Journal* outlined the historical significance of a transportation highway that connected Lake Michigan with the Mississippi. Such a riparian link would offer cheap shipping as well as a conduit to control of the regional economy.[449] Waterways that joined the Great Lakes with the Mississippi, according to the *Journal*, often "fed the greed" of those in Chicago and that such riverine transportation networks "defined the geological epochs required to prepare (Chicago's) elite" for "further dominance." Harnessing the potential of the Chicago River and portages alone were not

[447] "The Ship Canal," *Peoria Journal*, 8 January, 1891, 2.
[448] Ibid.
[449] Ibid.

enough to secure the financial success of the city, according to the *Journal*. Rather, it was necessary to control travel and transportation throughout the Illinois River valley to secure such commercial leverage. Environmental and economic control of the region, therefore, was the true goal of the SDC and the General Assembly, rural writers at the *Journal* concluded.

Dilution emerged as the SDC's concession to rural opposition, although it seemed to instill little confidence. Many journalists, both urban and rural, remained skeptical about the effectiveness of waste dilution once refuse moved beyond Chicago's city limits. The Ottawa City Council, which supported the drainage plan, pushed for more effective dilution of wastewater as it flowed downstream.[450] The belief that the city simply wanted to dump its refuse on rural areas influenced many opinions of the project. Increased taxation in northern Illinois also incited significant public opposition, although most Chicago-area residents ultimately accepted the higher taxes. Despite Peoria's reticence and the continued support of small towns in northern Illinois, pressure remained for the SDC to develop a sound dilution plan to ensure that dilution would adequately dissolve sewage once it flowed down the Illinois River.

Enough skepticism, concern, and opposition existed to warrant yet another convention in a small, Illinois town. Between late February and early March of 1890, merchants, shipping companies, and rural residents met in Joliet where the planned sanitary canal would flow into the Illinois River. The Joliet Convention largely debated the dilution issue and the provisions made (or not made) for dilution in the General Assembly's charter for the SDC.[451] Another key issue on the convention's schedule was the Munn Resolution, a stipulation proposed by the CAC and opposed by the Joliet Businessmen's Association. The resolution would require that Chicago build pumps on the South Branch of the Chicago River near the Bridgeport neighborhood and

[450] "Drainage Debate," *The Ottawa Plain Dealer*, 2.
[451] "Drainage," *The Ottawa Free Trader*, 8 March, 1890, 3.

siphon over 600,000 cubic feet of water per minute through the proposed canal for sewage dilution.[452] Joliet city leadership, however, agreed to allow Chicago to pump only 300,000 cubic feet of water per minute, therefore reducing the rate at which sewage water would be treated.[453] The Joliet Businessmen's Association argued that Chicago meet the requirements outlined in the Munn Resolution to ensure that sewage coagulation did not occur in Joliet and harm shipping revenue.[454] Joliet's business-leaders essentially wanted to pass Chicago's sewage to another town. Fortunately for the SDC, the CAC's Munn Resolution also provided for easier transportation as supported by the added water depth of the canal once water flow increased to 600,000 cubic feet per minute.[455] Increased canal traffic was commercially attractive for Joliet and other downstream communities. The Businessmen's Association, therefore, presented a strong case to the Joliet city council to support increased dilution.

As the Joliet dilution debates reveal, drainage was a commercial issue more than it was a sanitation issue. The day after the *Ottawa Free Trader* reported on the proceedings of the Joliet Conventions, a large fire devastated a significant portion of Joliet's downtown area.[456] Firefighters struggled to pump adequate water to the fire site, which furthered the argument in favor of a larger, deeper waterway on Joliet's banks. Public safety, according to the Businessmen's Association, was also a chief concern of the drainage and dilution issue. Surprisingly, Joliet joined Peoria in opposing reversal. The prospect of a stronger, more dominant Chicago worried Illinois Valley towns. Diversion promised to yield regulation of

[452] The Citizens Association of Chicago, *The Chicago Drainage and Water Laws* (Chicago: Chicago Legal News Print, 1889), 11.
[453] *The Ottawa Free Trader*, 8 March, 1890, 3.
[454] Ibid.
[455] *The Chicago Drainage and Water Laws*, 10.
[456] *The Ottawa Free Trader*, "Sunday," 9 March, 1890, 5.

commercial shipping traffic to Chicago. Downstate Illinois remained divided about whether to support a public works project that would provide improved sanitation or economic prosperity.

These Joliet Conventions comforted many citizens who previously believed their opinions went ignored. Following the public meetings, residents near the Des Plaines River discussed the project with their representatives in the General Assembly. Overall, there was significant support for the project and most state politicians were hopeful that it would improve Chicago's sanitation. Despite negative press, contentious dilution debates, and bickering over minutiae related to canal depth, Illinois Valley representatives conceded and authorized the project in the General Assembly by a margin of 92 to 42. Some stalwart opponents broke ranks and sued the SDC in the Illinois Supreme Court.[457] The court maintained that the state possessed the right to construct a sanitary canal to facilitate commerce and defend public health.[458] Commerce, again, proved a uniting concern among both supporters and opponents of diversion. Sanitary improvements remained a secondary goal of the reversal project.

The Sanitary District Enabling Act outlined the SDC's tasks and responsibilities as well as defined constraints. Upon completion, the SDC would have to maintain a water flow and current at "no less than 22 miles an hour" to facilitate efficient navigation of the sanitary channel.[459] Additionally, the Enabling Act specified the scale of the SSC. The canal would be "no less than 160 feet wide and 22 feet deep," and the SDC would receive federal assistance for the channel's construction.[460] The law prohibited the formation of other sanitary or engineering entities outside the SDC, meaning it had to, initially, complete the SSC alone and with its own

[457] "Enabling Act," *Ottawa Free Trader*, 10 March, 1890.
[458] Supreme Court of the State of Illinois, *Bodman v. Lake Fork Special Drainage District, et. al.*, 31 May, 1890 (Springfield, IL: Norman L. Freeman, H.W. Rokker Stereotyper, Printer, and Binder, 1890), 439.
[459] *The Chicago Drainage and Water Laws*, 9.
[460] Ibid., 12.

resources until federal assistance could pass Congress.[461] Per the Munn Resolution, adopted in the Enabling Act, the SDC obtained the ability to generate revenue from the operation of docks and hydraulic pumps that provided water, and eventually electricity, to various neighborhoods.[462]

Access to shipping tolls and pumping works provided another point of contention for rural political and economic leaders. Residents and politicians in both Peoria and Joliet believed that Chicago would benefit further, financially, from increased sewage pumping through the proposed canal. Not only was there not a significant obstacle to industrial dumping in the first place, the SDC, supposedly tasked with defending public health and water quality, stood to make money off of sewage in the Chicago River.[463] The SDC generated some of its own revenue from both shipping and sewage along with the public funding it received from the State of Illinois.[464] The canal revenue debate reveals that both Chicago and rural communities knew that commerce was the governing issue surrounding diversion. Both Chicago and its rural partners sought financial gain. State legislators wanted the SDC to maintain transparency and ensure that all public funding appropriately supported canal building, but the laws, as written, provided no reason for the SDC or commercial interests to embrace such transparency. Public pressure, therefore, forced the SDC to establish various internal committees and boards to report to the Illinois General Assembly about the progress of construction.[465] A largely bureaucratic process, which many diversion critics derided, simply engendered more bureaucracy.

Rural opposition in the years prior to the passage of the Enabling Act inspired protections for towns along the Illinois River. "Incorporated" towns, communities, and entities, along the

[461] "Enabling Act," *Ottawa Free Trader*, 4.
[462] "What the Drainage Law is For," *The Chicago Daily Tribune*, 11 August, 1889, 1.
[463] "Why the Illinois and Michigan Canal is Closed," *Ottawa Plain Dealer*, 12 March, 1890, 3.
[464] *The Chicago Drainage and Water Laws,*12.
[465] The Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal*, 403.

river's banks downstream from Chicago, would have access to and "ownership of waterworks and pumping units."[466] Monetary benefits from shipping traffic, improved access to running water, and hydraulic revenue, helped generate support for the drainage plan and the dilution methods favored by the SDC and the Enabling Act.[467] Although rural media outlets continued to criticize the SDC, the reversal, and the financial control Chicago gained upon the canal's opening, merchants in the Illinois River Valley remained supportive once they learned of predictable shipping revenue.

In response to tepid rural support, the SDC and others who promoted drainage prior to its founding argued that a new sanitary canal would also necessarily be a *ship* canal. Not every rural citizen appreciated the gesture. The word "ship" for Gersh Martin, an editor for the Joliet *Press and People*, seduced rural merchants into backing Chicago's drainage "schemes."[468] Martin declared that the Chicago press's use of the word "ship" was "misleading," and had nothing to do with "the drainage and the improvement of navigation of the Illinois River."[469] Instead, the *Press and People* editor concluded that Chicago's drainage plan concerned the improvement of the city's sanitation and commercial standing at the expense of the Illinois River Valley's public health and economy. Martin argued that, in addition to improved waste disposal, Chicago would secure "all the inland commerce from the Niagara to the Gulf of Mexico" which would travel via this "inland waterway, secure from any hostile foreign interference." The so-called sanitary and "ship" canal was a financial boon for a city that sought commercial dominance. Further criticizing the "capitalists of Chicago and North America," Martin articulated a burgeoning

[466] *The Chicago Drainage and Water Laws*, 9.
[467] "Why the Illinois and Michigan Canal is Closed," *Ottawa Plain Dealer*, 4.; "Joliet People Protest: They Don't Like Chicago's Drainage Scheme," *Chicago Daily Tribune*, 21 January, 1889.
[468] Gersh Martin, "Chicago Drainage and the Illinois Waterway," *The Joliet Press and People*, 10 July, 1889, 1.
[469] Ibid.

opposition to technocratic solutions that seemed to bolster the economic power of industrialists rather than serve the public good.[470]

Martin reinforced a criticism of drainage that long preceded the founding of the SDC and the conception of the reversal plan: the active encouragement that the reversal would provide industries to continue dumping as they always had. Upon completion, the proposed SSC would allow for the construction of "mills, factories, and furnaces of all kinds could be built and water power furnished every half mile from Joliet to LaSalle."[471] What Martin correctly outlined was that not only would drainage give those dumping waste the confidence to continue doing so, but that it would actively power their industrial facilities. With "600,000 cubic feet per minute, as proposed," according to Martin, the SSC "would create the greatest and longest reach of continuous water- power on this or any other continent."[472] Such tremendous power, as would be generated by the canal, stood to dramatically increase Chicago's profitability along with those who chose to conduct business in the city or its surrounding areas.

Therein lay the remaining concern held by Martin and other Illinois River Valley residents who opposed diversion. The perception that the SDC was not completely transparent in their intentions for the reversal worried many community leaders and political reformers. Reversal could well be created for the protection and advancement of industry, not the reform of enormous sanitation challenges that threatened the public's health. Improved transportation, effective waste removal, and hydroelectric power, as Martin described accurately, were all powerful motivators for the support of the Chicago reversal plan. Such measures also promised profit.

---

[470] Ibid., 2.
[471] Ibid.
[472] *The Chicago Drainage and Water Laws*, 9.

Nonetheless, Martin, despite his criticism of how the SDC discussed its drainage plan and specific intentions of those managing the project, still believed that Chicago's sewage problem merited a "bold solution." Rural opposition, according to Martin, was influenced by those who held a "local prejudice" to drainage rather than a "wide breadth of public spirit."[473] Invoking imagery of American "empire," Martin exhibited the dual intentions of many reformist-minded individuals: public works and improvement meant a stronger imperial state.[474] Chicago's drainage plan was further bolstered by support from the federal government, and, specifically, the US military, as discussed in this dissertation's third chapter.[475] Enough advertising occurred to also convince rural business and community leaders to also lend their commitment.[476]

Despite some favorable ovations from Central Illinois, support was far from consistent. While some politicians and Illinois River Valley business leaders found the dual goals of improved commerce and sanitation compelling, high-ranking public officials remained doubtful. Indeed, Mayor John A. Roche of Chicago and Mayor Joseph Paige of Joliet officially opposed the drainage bill proposed on March 13th.[477] A "jubilant" Paige had assumed that failure of the House vote proved the political unpopularity of the drainage issue to a broad base of Illinois constituents.[478] Political pressure from business-leaders and elected officials alike forced the failure of the General Assembly's proposal for drainage parameters. Rural residents in the

[473] Gersh Martin, "Chicago Drainage and the Illinois Waterway," 1.
[474] Michael McGerr, *A Fierce Discontent: The Rise and Fall of the Progressive Movement in America*, 1870-1920 (New York: Oxford University Press, 2006).
[475] The Board of Trustees of the Sanitary District of Chicago, "First Annual Meeting," *Proceedings of the Board of Trustees of the Sanitary District of Chicago* (Chicago: City of Chicago Publishers, 27 January, 1889), 2-3. The US Navy sought to use the canal to transport materiel and personnel for training operations on Lake Michigan. The US military also sought the use of a continental riverine transit network in the event of foreign invasion. See Chapter 3.
[476] "The Sewage of Chicago," *The Chicago Daily Tribune*, 21 July, 1889.
[477] "Postponed to April 11th: House Fails to Pass Chicago Drainage Bill," *The Chicago Daily Tribune*, 14 March, 1889, 9.
[478] "Mayor Paige is Jubilant," *The Chicago Daily Tribune*, 14 March, 1889, 10.

Illinois River Valley dreaded the amount of sewage flowing out of Chicago, whereas Chicagoans found the overall price tag for the project to be untenable.

Failure of the first drainage bill also dealt a political victory to the Democrats, most of whom sided with rural Grangers over the issue of drainage. Republicans concerned with sewage improvement but also with overwhelming financial costs sided with the Democratic opponents of the drainage bill. A strong coalition, therefore, between both rural and urban skeptics emerged. That coalition remained throughout debates surrounding the formation of the SDC.

Ultimately, federal funding broke the stalemate between supporters and opponents of Chicago's drainage plan. On 11 April, the General Assembly passed its second drainage bill, with Congressional aid and afforded the SDC both the political and financial leverage it needed to continue with reversal.[479] US Representative for Illinois's Third Congressional District, which included West-Side Chicago, William E. Mason, proposed that the federal government assist in the construction of a drainage channel as part of building a "national waterway." This cooperation, according to Mason, would create "not only a commercial highway," but an equivalence in financial strength on a national scale "with Great Britain." Such cooperation between the federal government and the city of Chicago concerning drainage had long been planned. The US Navy saw a connection between the Gulf of Mexico and the Great Lakes region as advantageous for nearly twenty years. The Civil Engineers' Club of the Northwest, of which Ellis Chesbrough was a member, engaged with the US military in drainage discussions. US naval commanders agreed that a transportation network connecting the Gulf of Mexico with the Great Lake was essential for national security. Defense, by usage of a large shipping canal would offer

[479] "Mason's Drainage Bill: It Provides that Uncle San Shall Help Dig the Ditch," *The Chicago Daily Tribune*, 20 January, 1890, 2.

the US an effective bulwark against foreign interference.[480] It is unsurprising that drainage supporters sought to exploit this long-held agreement. Both supposed national security interests and the movement toward improved sanitation emerged as a joined bloc from these discussions.

Representative Mason's efforts revealed that the drainage issue intersected with contemporary reform movements of the period. Reform, in the context of the Chicago drainage project, could mean a departure from the status quo while simultaneously defending it. Much like Gersh Martin, Representative Mason saw the potential to bolster an American empire with a new commercial center along the Mississippi, north to Chicago rather than centralized on the Eastern Seaboard.[481] Technocrats, politicians, and thoughtful merchants all supported such a cause through the auspices of "improving" the city, whether that meant water quality, transportation, or commercial development. Drainage also offered the potential for improvement in the same rural areas that supplied Chicago and facilitated its growth over the last fifty years. This reformist perspective exhibited many similarities with infrastructural projects of the early-nineteenth century. Improved transportation and communication produced an expansion of commercial development.[482]

Connecting disparate regions across great distances, canals, turnpikes, and telegraph lines afforded unprecedented financial growth. But, as George Rodgers Taylor contends in his classic 1954 book, *The Transportation Revolution*, these efforts were, in many ways, far more revolutionary in their application than the burgeoning industrialization movements taking place along the eastern seaboard.[483] The time used to transport not only goods, but ideas, declined by

[480] Civil Engineers' Club of the Northwest, *Proceedings of the Civil Engineers' Club of the Northwest, Vol. IV*, "City Drainage" (Chicago: Civil Engineers' Club of the Northwest, 1878-1879), 102-103.
[481] "Mason's Drainage Bill," *The Chicago Daily Tribune*, 2.
[482] George Rodgers Taylor, *The Transportation Revolution* (1954).
[483] Ibid., 5.

almost half between 1800 and 1830 and those who supported such efforts often cast those projects in public service terms. “Improvement” meant not also the creation of an entirely new infrastructure, but also held environmental connotations. Essentially, works to “improve” the landscape and to harness its ecological resources to produce goods, services, and ideologies, reinforced the idea that geological, ecological spaces remained useful only if they served human needs. That same reformist ethos continued into the late-nineteenth century and influenced much of how discussions surrounding Chicago’s drainage proceeded.

Reform framed how technocratic experts, including engineers, engaged Chicago’s sanitation and its socio-political relationship with surrounding residents. Sanitation crises also allowed engineers to participate in civic engagement. Through public outreach efforts, a commonality emerged: a disregard for the actual needs of citizens. Instead of communicating directly with Illinois Valley citizens, both technocrats and politicians often told rural citizens what was best for them at any given moment. This was evidenced by both Martin’s and Mason’s characterization of the drainage debate. Each man seemed to scold those opposed to diversion for not promoting their own local interests in a manner that Chicago’s technocrats would have found acceptable. Instead, Martin and Mason argued that expertise, state- recognized knowledge, was evidence enough to ensure that all residents, both urban and rural, were served sufficiently.

The conventions at Peoria and Joliet revealed that such a perspective was not only inadequate and inaccurate, but also insulting to those holding legitimate concerns about sewage mechanically, downstream, toward their communities. Those conventions were nonetheless successful in organizing political pressure that at least made the drainage debate far more contentious and democratic. Without consistent support from Chicago’s rural partners, drainage could not proceed at the scale that the city and its technocratic leadership required. In Chicago’s

case, reformism proceeded along highly exclusionary terms. It was popular, rural protest and organization that laid bare the limitations of the technocratic-reformist perspective that long neglected non-urban residents.

Construction Begins

Construction of a sanitary channel would allow Chicago's economic and political leadership to remake rural Illinois in the image of commercial prosperity for a rapidly expanding urban center. Promises of riverfront development, as articulated in Illinois River Valley media outlets, were a convenient way to convince those living outside of Chicago that they would benefit from the project. Realistically, such developments would mean increased revenue for Chicago and assurances that commercial shipping steamed north toward Lake Michigan. According to the Illinois Canal Commissioners, in 1885, shipping disbursements on the Illinois River north toward Chicago increased from approximately $106,000,000 to $117,000,000 between 1881 and 1882.[484] The I&M Canal alone earned $85,947.38 in tolls in 1881 and $98, 581.19 by the Board's next reporting in 1894.[485] Although tolls to the I&M Canal between that 11-year period were fairly modest, what had also increased was the number of places collecting tolls as well. Instead of toll-collection at only major ports, namely Peoria and Joliet, soon, Ottawa, Copperas Creek, and Lockport all began collecting tolls.[486] The added toll stations were discussed in the Canal Commissioners' report to the Illinois governor in 1882 and established over the next decade.

---

[484] Illinois Canal Commissioners, *Report of the Canal Commissioners: Made to the Governor* (Springfield, IL: H.W. Rokker State Printer and Binder, 1883), 5; Board of Trustees of the Illinois and Michigan Canal Commissioners, *Illinois and Michigan Canal: Rules, Bylaws, and Regulations* (Geneseo, IL: Republic Book and Job Printing Establishment, 1885), .

[485] Illinois Canal Commissioners, *Report of the Canal Commissioners: Made to the Governor*, 15.; Illinois Canal Commissioners, *Report of the Canal Commissioners: Made to the Governor* (Springfield, IL: H.W. Rokker State Printer and Binder, 1895), 15-16.

[486] Illinois Canal Commissioners, *Report of the Canal Commissioners: Made to the Governor*, 1882, 16.

Both Chicagoans and rural Illinoisans reaped the benefits of increased shipping. "Improvements," although maligned by many Illinois River towns, made money and consolidated revenue in Chicago while improving the city's sanitation. Both town and country experienced financial rewards for supporting drainage, but the extent of those rewards was uneven. Representative Mason's efforts in conjunction with these developments reflected the broad support among urban and rural citizens for commercial expansion provided by the proposed drainage channel. So long as money was made, support would grow. Arguments made in support of greater national defense also proved convincing and drainage advocates saw themselves as patrons of business and national prestige. Mason was more than successful in realizing this potential for a drainage channel. Congress agreed to appropriate around $20,000,000 to support the construction of the new canal and Mason cast the sewerage issues as financially beneficial for Chicago and an improvement of American economic standing. Although federal support moved some drainage opponents toward a specific and comprehensive sanitary plan, criticism remained in Chicago and the Illinois River Valley.

The Enabling Act also allowed the SDC to establish its governing bodies and the Board of Trustees.[487] Together with the Drainage Board and the Board of Engineers, the SDC Board of Trustees assessed environmental conditions and canal construction.[488] Many officials working on the Drainage Board then went to work on the Board of Trustees for the SDC. One such leader was the honorable Judge Richard Prendergast, a diversion defender for over a decade.[489] As the first acting president of the Board of Trustees, Prendergast was responsible for administrating the

[487] The Board of Trustees of the Sanitary District of Chicago, "First Annual Meeting," *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, 2-3.
[488] *The Chicago Drainage and Water Laws*, 2-3.; "Legislation for Cook: Bills to be Introduced that Will Affect Chicago," *The Chicago Tribune*, 11 January, 1891, 2.
[489] "Legislation for Cook," *The Chicago Tribune*, 2.

SDC's daily operations and for organizing the logistics of the agency. The Board of Trustees viewed this as an advantage in that it would provide consistency across public agencies. Nonetheless, Prendergast and the organization's leadership opposed any legislation that would increase the number of members on the Board of Trustees. The Chicago media, including the *Chicago Daily Tribune*, saw an increase in the Board's membership as essential to prevent extreme turnover in membership after elections.[490]

Almost immediately, coordination of the Board of Trustees invited political conflict. Despite earning the General Assembly's authorization and ample funding, political strife threatened the project early on.[491] According to the SDC's daily proceedings, the Board of Trustees squandered more than one million dollars of public money to begin work.[492] Cooley himself, despite being a trained engineer, was a far better politician. Richard Prendergast, a Chicago lawyer and financier, had won the presidency of the SDC's Board of Trustees in 1889. Controversial events soon followed Prendergast's election. Cooley first ordered additional surveys of the construction area that wasted time and money. Under Cooley's supervision, officials duplicated many findings from previous surveys and proposed unnecessary modifications to the canal design. As an engineer, these mistakes were not only inexcusable, but inexplicable. The SDC's Board of Trustees, at Prendergast's request, fired Cooley as Chief Engineer after only two years of work and hired his chief lieutenant, William E. Worthen, to avoid an investigation by the Illinois General Assembly.[493] Media criticism amplified these problems.

---

[490] Ibid.
[491] Ibid., 405.
[492] Richard Prendergast, "Drainage Board," *Proceedings of the Board of Trustees of the Sanitary District of Chicago* (Chicago: City of Chicago Publishers, 27 November 1891), 279.
[493] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 408-11.

Covering the SDC's meetings in 1891, and Cooley's supposed blunders, the *Chicago Daily Tribune* challenged the agency's competence. According to a staff writer at the *Tribune*, "trivial debates amongst board members" slowed progress.[494] The loss of valuable time, rooted in Cooley's wasted ventures claimed more casualties in the agency. Prendergast himself also lost his post as SDC president amidst the Board's controversies and Illinois politics.[495] In 1892, Cooley seemingly exacted his revenge for being fired. In that year's mid-term elections, Republicans regained control of the General Assembly. Having chartered the SDC, the General Assembly could nominate and promote individuals on the SDC's Board of Trustees. Cooley, a Republican, gained favor and secured a place on the Board, despite his removal as Chief Engineer. This pressure forced Prendergast, a Democrat, to resign, amidst his party's loss of power.[496] Prendergast lost the Board presidency and, although failing as Chief Engineer, Cooley had remade himself as a politician. These controversies occurred at the expense of improved sanitation. Once again, the drainage issue prompted controversy and further obscured and impeded the real goals that both supporters and opponents of the reversal project held. Thus, the drainage law, drafted to ensure transparency, generated doubts among rural and urban residents that such sincerity was possible.

To address criticism from Chicago and Central Illinois, the SDC used $500,000 to construct committees that would engage with reporters and defend the agency's positions.[497] Smaller departments were then assembled that dealt with responsibilities such as press briefings and labor relations. Ultimately, the SDC's organization reflected the complexity of its assumed

[494] Ibid., 423.
[495] Ibid., 425.
[496] "For a Great Waterway: Work Begun on the Big Ditch From the Lakes," *The New York Times*, 3 September, 1892, 6.; *History of the Chicago Sanitary and Ship Canal*, 425.; "To Begin the Ditch: Drainage Board to Hold 'Shovel Day' Ceremonies," *Chicago Daily Tribune*, 2 September, 1892, 8.
[497] The Board of Trustees of the Sanitary District of Chicago, "First Annual Meeting," 4.

task, and operated efficiently, with the Board of Trustees meeting daily. This configuration allowed the SDC to act as the primary steward of sanitation and water distribution for metropolitan Chicago, an arrangement in place today.[498]

A *Tribune* staff writer also reported another reason for re-structuring within the SDC: The World's Columbian Exposition. Chicago's city council and many business leaders believed the agency required a more permanent organizational structure to address the city's cleanliness and "beautification" in preparation for the World's Fair. Chicago had already acquired approval from the national World's Fair committee to hold the event there in 1893.[499] Political turmoil, throughout Illinois and in Chicago, threatened this stability. The CAC pressured city council members and the General Assembly to have a greater role in SDC administration, particularly Murry Nelson, the intrepid chairmen of the CAC. Eventually, Nelson found his way onto the Board of Trustees to prevent further political tensions. Although Prendergast, a Democrat, and Nelson, a Republican, belonged to opposing parties, the temporary truce at least solidified the agency. The potential loss of rights to host the fair proved far more threatening to the city. Revenue from such a massive event would tremendously benefit Chicago and municipal leadership sought to defend the World's Fair at all costs. Rural opposition, according to the *Tribune*, increased in response to these debates. Political wrangling and intrigue surrounding the World's Fair seemed to corroborate claims from Illinois River Valley residents that drainage was a commercial scheme to enhance Chicago's financial position in the region.[500]

Despite earning the state's authorization and initially ample funding to begin construction, problems surfaced quickly. Indeed, work did not commence on the SSC for another

[498] Today, the Sanitary District of Chicago is known as the Metropolitan Water Reclamation District of Greater Chicago.
[499] "Legislation for Cook," *The Chicago Daily Tribune*, 2.
[500] Ibid.

two years after the SDC's founding.[501] In the interim, according to the SDC's daily proceedings, the Drainage Board squandered more than one million dollars of the money procured from public sources to commence construction.[502] While Chief Engineer, Cooley had ordered unnecessary surveys of the areas affected by canal construction, which wasted time and money.[503] Officials duplicated many earlier findings from previous surveys and proposed additional modifications to the canal plan without considering their ultimate necessity when operating under Cooley's supervision.[504] Worthen incorporated some of Cooley's work, but recommended the building of additional trenches between the towns of Summit and Joliet. The proposed trenches would allow engineers to make deeper cuts in the bedrock on the canal floor, increasing water flow and saving $25,700,000 in construction costs over the length of the project. Prendergast and other trustees, including Board-member Cooley, authorized the move and the spending of an additional $7,000,000 a year in both labor and materials.

These events drew significant criticism from Chicagoans and Central Illinois residents, reflected in press coverage. Prendergast feared ongoing opposition from the outset.[505] Despite proclamations to the contrary, the SDC leadership had "promised decisions and action...but has yet to take any," instead engaging in "needless talk of hydraulic pumps rather than action."[506] It took an entire year for work to commence as Worthen and other SDC members debated the canal's route.[507]

---

[501] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 405.
[502] Richard Prendergast, *Proceedings of the Board of Trustees of the Sanitary District of Chicago*, "Drainage Board," 27 November, 1891, 279.
[503] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 408.
[504] Ibid., 408-11.
[505] "The Drainage Canal Meeting: No Definite Action Taken-Another Meeting to be Held," *Chicago Daily Tribune*, 23 October, 1891, 3.
[506] Ibid., 3.
[507] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 423.

Nonetheless, amidst political wrangling and public skepticism, construction finally began in 1892. The SDC held an inaugural ceremony on September 3 near the Cook County line. A train carrying state dignitaries arrived at a small platform. Various members of the General Assembly and SDC leaders gave speeches emphasizing the canal's potential to "improve" and "advance" Chicago.[508] Those in attendance included new SDC President Frank Wenter, Trustee Prendergast, Trustee Cooley, and Chief Engineer Worthen. Speakers supported the politicians' "unwavering commitment to the public interest," through attention paid to citizens' sanitary concerns.[509] The SDC selected the location as it provided the boundary between the two areas most affected by pollution: Chicago in Cook County and the river valleys in DuPage County.[510] The paper also mentioned the location's importance in reflecting the unity brought by a shared interest in better sanitation between Chicagoans and rural Illinoisans.[511]

This inauguration attracted national interest. The *New York Times* sent a contingent of reporters to cover it, highlighting diversion's importance for Chicago and for the prevailing national sanitation movement.[512] Excavation of the proposed waterway represented an "enterprise that will rank, when completed, with the most important modern marvels of engineering."[513] Despite the pomp and circumstance, media coverage suggested that many Chicagoland residents still doubted the project's potential.[514] Pressure on the SDC and its endeavors steadily increased. As cholera persisted in Chicago, doubts about technocratic reformers' plans also remained.[515] Reporters at the *New York Times* simultaneously learned of

[508] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 424-5.
[509] Ibid., 427.
[510] "To Begin the Ditch," *Chicago Daily Tribune*, 8.
[511] Ibid., 8.
[512] "For a Great Waterway," *The New York Times*, 6.
[513] Ibid., 6.
[514] Ibid., 6.
[515] "Will Fight Cholera: Local Physicians Take Steps to Meet the Plague," *Chicago Daily Tribune*, 11 September, 1892, 3.

the political battles between SDC members and published scathing reports detailing the agency's intrigue to a national audience.[516]

Despite growing pessimism about diversion in Chicago and from its chief rival, New York City, the SDC continued excavating the continental ridge along Chicago's western perimeter. Secondary streams and rivers, however, proved as crucial to this project as the gently sloping Illinois plains. Feeder channels, including the Des Plaines and Calumet rivers, required leveling and dredging to insure a sufficient current for the canal link to be built between the Chicago and Des Plaines rivers.[517] Workers detonated several tons of TNT on a small hill that straddled the Cook and Will county line, for example, to alter the area's elevation and to create a space for the canal bed.[518] Although the initial plans involved using the original I&M Canal and Des Plaines River beds for the SSC, the SDC needed to accommodate a much larger space for the waterway while varying the canal floor's elevation. This phase of the construction process lasted some two more years before dredging work commenced on the feeding rivers.

Construction Timeline for SDC Waterways		
Component/Project	**Started**	**Completed**
1. I&M Canal---Connected to the SSC at Lockport, Ill.	1836	1848
2. Chicago Sanitary and Ship Canal	1892---(Excavated between 1893 and 1896)	1900
3. North Shore Channel-Wilmette, Ill.---Connected via the North Branch of the Chicago River	1907---(Excavated between 1908 and 1909)	1910
4. Calumet-Sag Channel---Connected to SSC at Lemont, Ill.	1911---(Excavated between 1912 and 1914)	1922

Table 1: Construction Schedules for the Components of the Sanitation System.

[516] "For a Great Waterway," *The New York Times*, 6.
[517] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 106.
[518] "To Begin the Ditch," *Chicago Daily Tribune*, 8.

Construction of the SSC occurred in phases, beginning with excavation. Dredging followed. The excavation and earth-removal process proved the most expensive and time-consuming phase in building the SSC.[519] By the time the SDC released its first engineering assessment in 1895, it already had issued more than $12,000,000 in bonds and estimated the total cost of the completed project to just more than $26,000,000.[520] SDC leaders believed this construction stage was the most important as it laid not only the foundation for the drainage ditch, but also the other channels that would facilitate pollution removal.

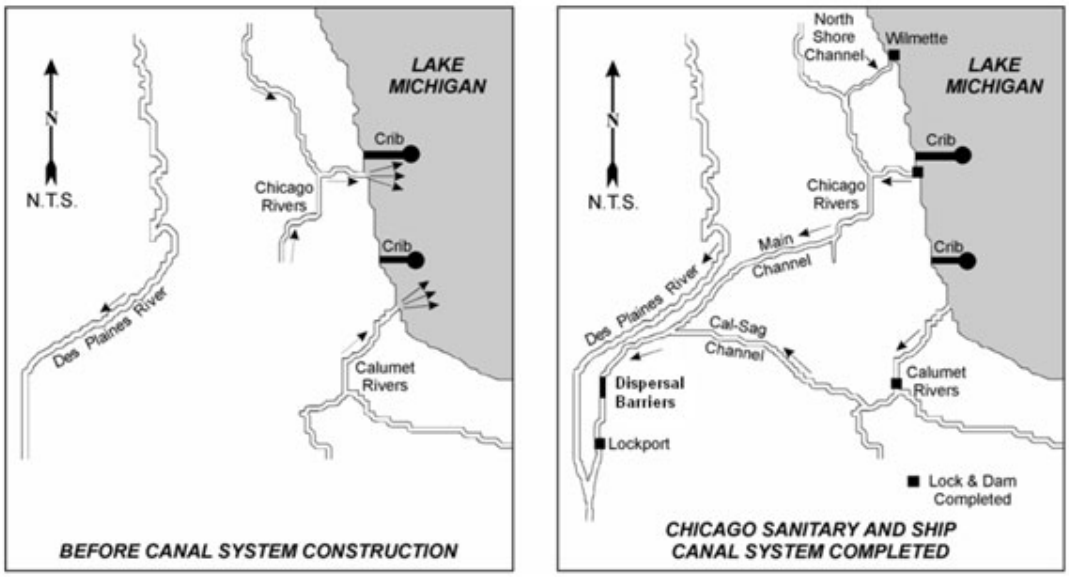


Figure 8: Sanitary and Ship Canal System: Before and After. Source: United States Army Corps of Engineers. http://www.usgs.gov/.

In September 1894, primary work commenced on the feeding waterways. A third Chief Engineer, Isham Randolph, rose to the position in 1893 after concerns emerged among Board of

[519] Sanitary District of Chicago, *A Concise Report on its Organizations, Resources, Constructive Work, Methods, and Progress* (Chicago: City of Chicago Publishers, 1895), 16. These documents can be accessed in their original printed format the Harold Washington Library Center in the Municipal Records collection in the Government Information division.
[520] Ibid., 7-18.

Trustees members about Worthen's competence. Work proceeded with greater efficiency under Randolph despite few changes to the agency's procedures. One such consistency was the continued use of contracted labor from surrounding communities including Romeoville and Lockport. Local companies could access the area easily without committing too many resources to transportation According to the SDC's engineering reports, Randolph also maintained the original construction plan.[521] Randolph garnered praise for achieving stability within the SDC.

Workers excavated one-mile-long sections along the SSC's path starting at Willow Springs.[522] Excavation proceeded easily in most sectors. Workers moved more than 26,000,000 cubic yards of soil at the height of work plus another 12,000,000 cubic yards of solid rock.[523] The SDC adapted much of this latter material for the flooring of the SSC's channels.[524] For this phase, the SDC primarily used new, larger steam shovels and steam hoists to dig and displace dirt, respectively.[525] This work occurred on an incline where wagons awaited the soil, rock, and sand for transport to holding areas. Workers then recycled the materials in other phases of construction.[526] Using a system of wagons and light-gauge trains, workers removed earthen material and provided transportation for equipment and personnel. Bridge-construction also bolstered this transportation framework. According to the SDC's engineering reports on the construction's early stages, workers could move a hundred yards worth of land in an hour with these machines. Engineers employed the cantilever conveyor to remove larger objects including boulders, but it also provided a bridge for the movement of equipment. This machine had wheels

[521] Ibid., 18.
[522] Ibid., 7. The SDC used the engineering reports during their internal meetings, and also referenced them in reports to the Illinois General Assembly. Neither the District, the City of Chicago, nor the State of Illinois published the documentation of the construction progress publicly.
[523] Ibid., 10.; "Advance on the Drainage Canal," *The Chicago Daily Tribune*, 1 January, 1895, 12.
[524] Ibid., 12.
[525] *A Concise Report on its Organizations, Resources, Constructive Work, Methods, and Progress*,12.
[526] Ibid., 8-15.

that allowed for 360-degree rotations and used two cantilever arms, attached with pans, to carry materials onto a conveyor belt running parallel to the ditch. At full capacity, it moved more than 500 cubic yards of earth in an hour.[527] Although large and cumbersome, the bridge only required one operator, making it efficient and relatively inexpensive.



Figure 9: New Bridge Crossing the Canal Ditch, Looking East, 1899. Image Courtesy of F.E. Compton and Co. (1914), Chicago Historical Society.

Conclusion

The SDC deployed many of the most popular construction methods of the period to build the canal. To move soil, sand, and gravel, engineers used steam shovels, steam hoists, and the cantilever conveyor. Generally, work in these sectors progressed quickly and in assembly-line fashion where machines lined the construction zone dislodging materials from the ditch. While working in submerged sections, laborers engaged in hydraulic dredging and used a small boat

[527] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 232.

fitted with a mechanized shovel to excavate sections of the river floor. Although a common strategy used in canal construction, the SDC report described the process as tedious and slow. The agency could not doubt, however, the method's effectiveness given its intended purpose. When used at peak efficiency, hydraulic dredging allowed workers to move 2,500 cubic yards of earth in the span of ten hours, easily making it one of the best options for underwater excavation. Above water, laborers used explosives and a new steam drill to dislodge heavy rock, while the conveyor bridge moved elements out of the trough onto rail cars, wagons, or holding containers for transport. The SDC relied on eleven cantilever conveyors for excavation, designating them "the best possible machines" for soil removal.

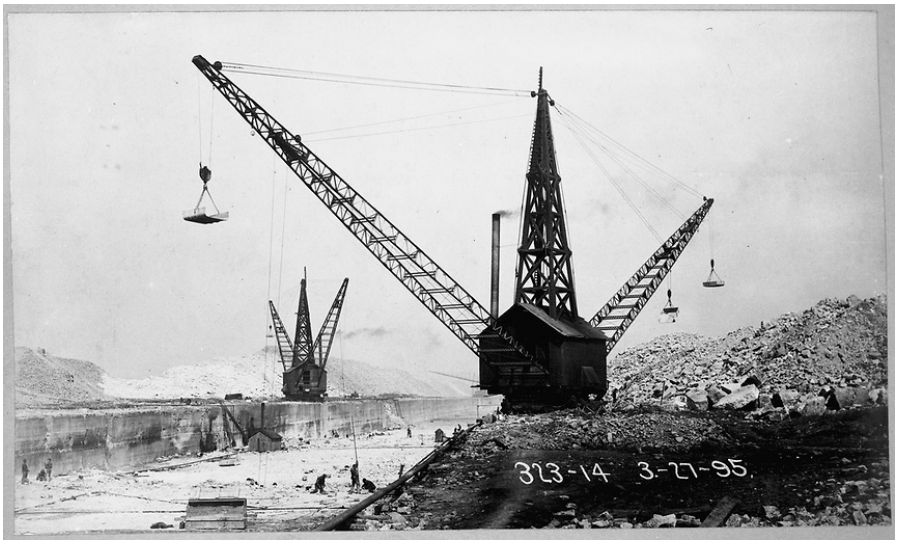


Figure 10: Lift Cranes along the Canal Ditch, 1895. Image Courtesy of the Encyclopedia of Chicago.

Construction proceeded steadily during its first full year. Between 1892 and 1893, the SDC made consistent progress on the SSC, excavating most of the main canal channel in under ten months. After 1893, problems again resurfaced. Labor disputes and continued political opposition from Chicago and rural opponents, challenged project more intensely than the SDC leadership had anticipated. Although the city of Chicago, regional industrialists, the State of

Illinois, and the federal government all pledged their support for diversion, local interests mounted further resistance to unwanted reform.

Lyman Cooley and the SDC had boldly embraced a vision of municipal infrastructure that Chicago urban planner Daniel Burnham later captured in his famous words, "make no small plans."[528] Construction of the SSC reflected more thoroughly the technocratic reformism that Burnham attempted to display, but in many ways failed to do. Despite Cooley's eventual departure as SDC Chief Engineer, his legacy loomed over the agency, its plans for Chicago drainage, and the reversal project until its completion in 1900. Cooley's tenure as Chief Engineer marked a significant shift toward the role of public works organizations in their efforts to exact a technocratic vision on local peoples largely opposed to that vision. Images shown above and below illustrate an ordered, predictable landscape, effectively managed by competent experts who knew best. Cooley, a formally educated engineer, found in his expertise a legitimacy and authority that Chesbrough had failed to grasp. While Chesbrough spent most of his career attempting to justify the technocracy he believed would adequately serve Chicagoans, Cooley approached his task as a fully vindicated and trusted technocratic reformer. Through change, Cooley brought continuity to who held the power to reform and how residents confronted a polluted environment. Like the World's Fair, the diversion would show that Chicago had arrived, overcoming both its environment and its resistant citizenry. White, middle-class reformers also expressed grave concerns about the city's refusal to offer direct assistance to Chicago's most vulnerable citizens.

[528] Daniel Burnham, Reported in: "Stirred by Burnham: Democracy Champion," *Chicago Record-Herald*, 15 October, 1910.

Chapter V: Planning an Exposition, Building Inequality, 1893-1910

Construction of the Chicago Sanitary and Ship Canal (SSC) occurred during the World's Columbian Exchange of 1893. Events surrounding the fair's promotion influenced completion of the Chicago River reversal. Held in Jackson Park on the city's South Side, the fair reflected Chicago's preeminence as a commercial center of a continental American empire.[529] Ironically, the fair took place amidst tremendous tension in the city. Pollution in the Chicago River contradicted the supposed triumph over nature represented by the technological advancements on display at the fair. Politicians, entrepreneurs and technocrats led the reversal project and administrated the fair. Chicago's political, commercial, and engineering leaders sought environmental and ideological victory that complemented the fair's perspective. While an intellectual battle over the meaning of reform raged, the reversal project prompted a once regional contest to expand nationally. Diversion prompted legal challenges from national rivals to Chicago's commercial dominance. The SSC and the World's Fair both represented the regulation of regional ecology. Building the SSC and reversing the Chicago River proved as much an effort to protect commercialization as to address sanitary crises. The World's Fair and the SSC's construction, therefore, encountered resistance from the city's most vulnerable communities.

Between 1889 and 1894, Chicago also witnessed a new coordinated opposition to reversal. This battle occurred between technocrats who sought social and environmental control, and reformers who desired social justice. While many scholars, including Michael McGerr in *A*

[529] For scholarly literature concerning the World's Fair see: Adria L. Imada, *Aloha, America: Hula Circuits Through the American Empire* (Durham, NC: Duke University Press, 2012)., Gail Bederman, *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917* (Chicago: University of Chicago Press, 1996). Both works illustrate the representation of people of color at the World's Columbian Exposition in Chicago. Imada and Bederman both contend that the World's Fair advanced the idea of a white, American empire and the supremacy of the white male over colonized peoples of color throughout US imperial holdings.

Fierce Discontent, have traced the overt similarities between both groups, the reversal of the Chicago River reveals tremendous distinctions.[530] Activists including Dr. Alice Hamilton, Jane Addams, and Mary McDowell argued for direct assistance to those living closest to the Chicago River's polluted waters. They argued that South-Side working class communities required improved housing, plumbing, and potable water distribution. Hamilton, Addams, and McDowell all explained how workers faced deplorable conditions on the job and at home. Those technocrats charged with diversion ignored this problem. Willingness to accept this appalling fact marked a significant distinction between those direct reform advocates and defenders of technocratic authority. Reformists concluded that the enormity of the SSC project offered a solution not to the social and environmental crises facing marginalized residents, but to the financial desires of the city's wealthy. An ideological conflagration emerged between the technocratic administrators of the river reversal and the reformers working to assist those closest to pollution. The reversal of the Chicago River in 1900 represented a reform of technocratic power enshrined in massive state agencies rather than direct improvement for vulnerable residents.

A Fair Obstacle

Although the Illinois General Assembly and the City of Chicago had approved diversion, managers of the World's Fair remained skeptical. Chair of the World's Columbian Exposition Planning Commission Lyman J. Gage, expressed concern about the massive earth-moving project about ten miles north of the proposed fair grounds in Jackson Park.[531] Gage, a local real estate baron who possessed tremendous influence on the Chicago City Council, had the ability to

[530] Michael McGerr, *A Fierce Discontent: The Rise and Fall of the Progressive Movement in America, 1870-1920* (New York: Oxford University Press, 2005).
[531] "Letter from M. Haley to Lyman J. Gage" (M. Haley, Publisher, 11 April, 1892, Chicago: Chicago Historical Society, 1892), 1.

stonewall the diversion plan. Along with the entire World's Fair Planning Committee, Gage sought the services of the Illinois Central Railroad Company to provide transportation to fairgoers. According to the *Chicago Daily Tribune*, the SDC had a disagreement with the Illinois Central concerning zoning rights.[532] The planning committee hoped to both secure the Illinois Central contract while also ensuring that the SSC project would not inhibit travel to Chicago for the fair. Instead, Gage asked the City Council to move forward with supposedly cheaper hydraulic pumping works in the Bridgeport neighborhood and to increase the depth of the Illinois and Michigan Canal (I&M canal).[533] This request ultimately reached the Citizens' Association of Chicago (CAC) and the Sanitary District of Chicago (SDC).

Transportation of personnel and materials proved an obstacle to SDC progress as it had the year before. Disagreement between the World's Fair Planning Committee and the SDC threatened to derail the fair and prolong canal construction. Railroad companies also challenged the SDC on right-of-way rights pertaining to rail lines near the canal path.[534] The Illinois Central argued that it had the right to construct new rail lines parallel to the I&M canal, despite SDC claims to that property for construction. Workers required about fifty yards of extra land to position equipment in place for canal excavation. The SDC needed access to rail lines for the purposes of transporting equipment, personnel, and construction wastes. Both entities reached agreement and the Illinois Central, along with other rail roads, resumed operations. Former Chief Engineer and SDC Board of Trustees member Lyman E. Cooley argued that the SDC should divide its contractual obligations among multiple contractors rather than settle on one entity to

[532] "Fair Directors Win: Aldermen Pass the Illinois Central Ordinance," *The Chicago Daily Tribune*, 24 May, 1892, 1.
[533] Letter from M. Haley to Lyman J. Gage, 1892, 2-3.
[534] "Against a Change: Mr. Williams Right of Way Suggestions Approved," *The Chicago Daily Tribune*, 24 March, 1892, 9.

satisfy the agency's construction needs. This measure would give the SDC leverage as contractors would compete for the available canal work. As an effective and influential Board member, Cooley continued to wield the agency with cunning effect. Per Cooley's recommendations, the SDC required the submission of three separate bids in order to win construction contracts for the drainage channel. According the *Chicago Daily Tribune*, this represented a steep burden for potential partners.[535] Companies would have to provide pricing quotes well ahead of their normal schedules, making the assembly of each bid a complicated process.[536] Although canal contracts seemed lucrative to construction companies, and those entities ultimately agreed to work for the SDC, the arrangement proved a steep monetary threshold for contractors to meet.

Construction bids also concerned Chicago's municipal and financial leadership. The city's flagship paper reported that such stipulations "at the present rate of progress, would cause significant delays in excavation work resulting from the contracts not being met."[537] The "Drainage Board cranks," as the *Tribune* referred to the SDC's leaders, "held other people's fortunes…yet could not determine the value of the property they wished to purchase and distribute."[538] As the agency tasked with directing the most complex challenge facing the city in its history, the SDC failed to instill confidence. Continued opposition in Central Illinois and in Chicago, reported in print media, did not help the SDC's situation. Cooley urged the SDC to select eight different construction contractors. For transportation, however, the results were rather different. The Illinois Central benefited from Chicago's transportation demands, both for

[535] "Quareling Over Land in a Riverbed: Beginning of Argument in the Drainage Board Suits in Will County," *The Chicago Daily Tribune*, 27 May, 1892, 5.
[536] Board of Trustees of the Sanitary District of Chicago, *Proceedings of the Board of Trustees of the Sanitary District of Chicago* (Chicago: Hazlett and Reed Publishers, 16 April, 1892), 224.
[537] "Against a Change," *The Chicago Daily Tribune*, 9.
[538] "Quarreling Over Land in a Riverbed," *The Chicago Daily Tribune*, 5.

the World's Fair and for the diversion project. Upon conclusion of tense debates, the Illinois Central surprisingly won a singular contract with the SDC to provide construction transit. This victory allowed the railroad companies to secure rights to construction across Chicago. The Illinois Central established a near transportation monopoly with new elevated railroads ("El") from the city's central financial district to the South Side fair grounds. Rural communities, and even many Chicago businesses, expressed financial concern about the requisition of entire railroads for the diversion project.[539] It is possible that the reticence voiced by Chicago merchants belied the belief that the reversal served primarily to bolster the city's industrial interests at the expense of taxpayers.

Transportation, sanitation, and ideology influenced the objectives of the city's political and financial leadership. Rail travel had changed Chicago's economic fortunes throughout the nineteenth century. Despite technological advancements and dramatic economic change since their arrival in 1851, railroads remained crucial. A drainage canal proved as important to those same political and economic goals to defend Chicago's regional dominance. Contractual disagreements were surely concerning as adequate transportation to the World's Fair represented a challenge for the event's planners. In April 1892, CAC member M.M. Haley wrote to persuade Gage that diversion was vital to the safety of fairgoers.[540] Haley, having documented the sanitary infrastructure built between Bridgeport and Joliet to aerate sewage, claimed that such measures proved inadequate. Illustrating his case for the new "drainage channel," Haley stated that "the pumps, buildings and power, with the embankments as proposed, will cost more than the canal

[539] Board of Trustees of the Sanitary District of Chicago, "Daily Proceedings," *In Proceedings of the Board of Trustees of the Sanitary District of Chicago* (Chicago: City of Chicago Publishers, February, 1892), 27.
[540] The author cross-checked Haley's name with numerous records from those of the CAC to public records and could not identify his first name. All signatures include the initials "M.M" as do the official minutes of the CAC and the World's Fair Planning Committee.

were it to fill up."[541] The perceived financial burden of drainage, a concern that plagued the project prior to its adoption, worried those within Chicago's business leadership, despite the excessive costs of other proposed solutions to riverine pollution. Haley's confrontation with Gage reveals that many of Chicago's entrepreneurs and boosters remained uninformed about the diversion project.

The cost of reversal required, once again, further clarification. As constant defenders of diversion, the CAC assumed the task. Haley argued that the canal was commercially beneficial, and that increased shipping traffic made diversion more desirable. Referencing the canal's navigable potential, Haley remarked that "the State granted the right to the City of Chicago to enlarge this channel navigation," and that "the people of Chicago who voted to be taxed for construction of the work understood it."[542] Not only did the General Assembly grant the right to this construction, Chicagoans had made a calculation in their best economic interest. Gage's concerns, although valid, might have reflected prevailing media narratives about the complexity of the SSC venture.

The *Chicago Daily Tribune*, documenting fierce debates in detail among SDC officials, revealed lingering opposition among rural communities to reversal.[543] Although originally supportive of diversion, some Illinois-Valley towns suddenly withdrew their support. Former Ottawa Mayor John Roche, who backed the Illinois General Assembly's Sanitary District Enabling Act, impeded proceedings at meetings between the SDC's Board of Trustees and the Illinois Canal Commissioners Board in Lockport. Roche claimed that he wanted Chicago to be the "best possible city the sun shines upon," but his proposed "solution" of re-routing the canal

[541] Letter from M. Haley to Lyman J. Gage, 1892, 4.
[542] Ibid., 5.
[543] "They Talk Drainage: The Vital Problem Discussed at the Union League Club," *The Chicago Daily Tribune*, 13 April, 1892.

proved suspicious. Claiming that pumping mechanisms were "inadequate," Roche argued that the SDC and the Canal Commissioners, "sought to plan a route more favorable to Chicago" and its cleanliness rather than the financial or sanitary concerns of rural communities. Pumping and hydroelectric power works at Lockport, according to Roche, were "ridiculous," and should be "shared more equally among Illinois-River communities and Chicago." "We want united action," Roche exclaimed, and that "the (SDC) trustees should support the act as it stands."[544] No doubt that Gage, and other World's Fair planners, were concerned about the volatile and seemingly continuous battles that surrounded the drainage channel plan. Fair promotion required cooperation with Chicago's Downstate partners. Reversal debates only heightened tensions and threatened that good will.

Debate only emboldened reversal's defenders. Haley, representing the most consistent supporters of the plan, seemed confident in the future success of diversion. "If there is any doubt as to the successful construction of the work as it has been proposed," Haley charged, "I will submit the plan of work to men who are interested in the welfare of Chicago and its people and will meet any criticism personally from whatever source it may come."[545] Haley eventually persuaded Gage. Less than a month later, Gage reported to the *Tribune* that "Chicago was on show" at the Fair, and that "the city's century of progress was as certain as ever before." The SDC would encounter no further opposition, at least on record, from the World's Fair Planning Committee. Construction proceeded unimpeded. Without this pressure from the CAC, the possibility remains that proposed pumping works at Bridgeport, which Gage and others on the World's Fair Planning Committee supported, might have replaced the drainage canal plan.[546]

---

[544] Ibid.
[545] Letter from M. Haley to Lyman J. Gage, 1892, 11, Chicago Historical Society.
[546] "Chicago to 'Be on Show' at the Fair," *The Chicago Daily Tribune*, 16 April, 1892.

Such a decision likely would have constrained or prevented the reversal of the Chicago River. Central Illinois support and the blessing of the World's Fair Planning Committee ensured that the project proceeded.

The World's Columbian Exposition proved monumental for the city. Chicago emerged from the event as the chief, if not only, rival to New York City. As the city's population rapidly approached one million, Chicago also represented the nation's second megalopolis. Numerous scholars have devoted substantial coverage of this event, so this dissertation will not re-capitulate that coverage. Regarding the reversal of the Chicago River, however, the World's Fair revealed the depths at which the city's leadership communicated their drainage and sanitation concerns. Politicians, business leaders, entrepreneurs, and experts all committed time and resources toward ensuring Chicago's success on a global stage and that the SSC project, together with the fair, were wedded to that goal. The SDC's reversal plan also illustrated how invested Chicago's municipal leadership remained in rehabilitating the city's image. After the 1871 fire, boosters sought to promote a revitalized and "reborn" city that could compete with the most important urban centers in Europe and North America.[547] Effective sanitation, or its absence, threatened to destroy the "century of progress" that Chicago's promoters, politicians, and industrialists promoted. Poor drainage, noxious odors, and steaming, festering sewage, also proved concerning for the World's Fair. Managers tasked with the fair's success depended on convenient transportation and effective waste management to ensure fairgoers' comfort. Pollution in the Chicago River, therefore, was a commercial concern rather than an opportunity for improved public service. That moment also provided space for technological experts to mount a noble defense of the city's interests while further legitimating their ability to do so.

[547] A.T. Andreas, *History of Chicago* (Chicago: A.T. Andreas, publisher, 1887), preface.

Despite these various concerns, the World's Fair of 1893 constituted a triumphant success. In addition to the fair's commercial victory, Chicago also gained a new transportation infrastructure that it lacked prior to 1893. "El" lines, particularly the South Side Elevated Railroad Company, connected the burgeoning South Side urban expansion areas with the increasingly congested central financial district of downtown Chicago.[548] Transit improved along with residents' ability to move about the city.[549] The lure of new public, green spaces in Chicago also garnered more attention for the national sanitation movement. As more residents moved toward Jackson Park, the fair's location, there was an increased interest in drainage.[550] The SDC and the World's Columbian Exposition Planning Commission even approved a failed attempt to link Jackson Park and Washington Park with the SSC.[551] Although SDC Board of Trustees president Frank Wenter ultimately chose to abandon the project, it reveals the extent to which the city had placed their trust in technological solutions to urban-environmental challenges. Drainage had engendered confidence.

"A Great National Waterway"

Adaptation and manipulation of the regional ecology remained necessary to complete the SSC. The complex riparian landscape that surrounded Chicago provided both an opportunity and an obstacle to the success of the drainage canal project. All waterways adapted to merge with the SSC system flowed to the Illinois River, south and west of Chicago. (See Figure 5) Each stream's flow proceeded according to its position along the Continental Divide. Rivers to the

[548] Today, the Chicago Transit Authority's (CTA) Green Line employs the same elevated rail tracks constructed for the World's Fair. They are a central component of Chicago's urban environment.
[549] For extensive coverage of Chicago's innovations in transportation see: Dominic A. Pacyga, *Chicago: A Biography* (Chicago: University of Chicago Press, 2011), Donald L. Miller, *City of the Century: The Epic of Chicago and the Making of America* (Urbana: University of Illinois Press, 1997), Carl Smith, *The Plan of Chicago: Daniel Burnham and the Remaking of an American City* (Chicago: University of Chicago Press, 2007),
[550] "Canal in the Midway: Work Progressing on the Waterway in Jackson Park," *Chicago Daily Tribune*, 24 August, 1894, 5.
[551] Ibid.

divide's west, flowed westward, away from Chicago. Those to the east drained toward Lake Michigan. The Des Plaines River, flowing from southern Wisconsin along the western edge of the divide, met the Illinois River at the town of Channahon, west of Chicago. The Little Calumet, far south of the divide, moves westward along Chicago's southern perimeter, connecting with the Des Plaines at Lemont. The Kankakee River, located about thirty miles to the south of the Little Calumet, also flows east to west and merges with the Illinois just south of Channahon. Among the rivers involved, the Chicago River remained an outlier. Located east of the divide, it flowed toward Lake Michigan. This waterway required the most technological adaptation. Prior to the I&M Canal's construction, no continuous link between the Illinois and the Chicago rivers existed. Although the I&M Canal established that link, extensive dredging, excavation, and hydraulic pumping were all required to complete the reversal. According to the SDC's plan, the completed SSC waterway would join with the Des Plaines, Calumet, and Kankakee channels south of Channahon, where it then merged with the Illinois River.



Figure 11: Rivers of the Chicago Area. Image courtesy of the U.S. Fish and Wildlife Service, http://www.fws.gov/midwest/mussel/images/chicago_rivers.html.

Digging the canal proved about as complicated as the regional riverine ecology. Although most soils encountered during excavation were swampy and porous, there was some variety to the earth that workers removed. The "glacial recesses," as documented in SDC engineering reports, were soft soils and sands mixed with some gravel that yielded easily to steam shovels.[552] Contract workers, including those from the American Stone Container Company, excavated in western Chicago and eastern Will County. While excavation occurred to Chicago's west, the SDC sent engineers north up the Des Plaines River to survey the stream's water flow.[553] Work began there on a nineteen-mile levee system meant to "divorce" the Des Plaines' waters into the new drainage trench that carried effluents out of Chicago and Lake Michigan.[554] Adding more glacial drift, gravel, sand, and rock to the bottom of the various waterways created a stronger shift in flow and strength of riparian currents.[555] An important aspect of the reversal project was the removal of land to build new channels. Engineers used much of the solid rock and gravel to construct new retaining walls and water locks to strengthen existing levees along the canal route.

Adaptation of natural waterways helped build human-made channels, forming a new, engineered ecology. Early excavation work showed that the diversion remade Chicago's riverine system in the image of an ordered landscape.[556] Despite the sanitary horrors caused by the city's surrounding waterways, they provided a foundation for both technological legitimacy and financial success.

---

[552] Board of Trustees of the Sanitary District of Chicago, "Daily Proceedings," *Daily Proceedings of the Board of Trustees of the Sanitary District of Chicago* (Chicago: City; of Chicago Publishers, November, 1894), 278.
[553] The Illinois Board of Canal Commissioners, "Proceedings: 4 December, 1896," *Minutes of the Meeting of the Illinois Board of Canal Commissioners, Vol. 9* (Springfield, IL: Illinois Board of Canal Commissioners, 1897, Microfilmed by the Microfilm Services of the Illinois State Archives), 17.
[554] The Board of Trustees of the Sanitary District of Chicago, "Daily Proceedings," November, 1894, 278.
[555] The Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal* (Chicago: City of Chicago Publishers, 1924), 220.
[556] For state-attempts to render landscapes "legible," uniform, and predictable, see: James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 2008), 108.

Although the diversion plan promoted technocratic expertise, canal construction proved challenging. During the early stages of construction, the SDC encountered personnel difficulties as the environment made excavation tedious. Thick soil, large boulders, and pervasive gravel "embedded in blue cement" proved "difficult to dislodge" in a section of the canal near Lockport.[557] Ricker, Lee and Co., another labor contractor, demanded additional funding to pay workers for the extra time spent trying to dig in difficult terrain. The SDC failed to inform many of the contractors about the type of earthen materials along the construction route. Workers then arrived at the site unprepared and often unequipped for excavation. According to some contractors, the SDC described most of the earthen matter as "glacial drift," that required little work to move. Instead, workers sometimes stood idle, awaiting the arrival of larger machines to displace rock from the channels. The unpredictable landscape forced workers to improvise. They devised alternative strategies for exploding the material or moving it piecemeal. Regardless of how they proceeded, workers remained on-site for much longer periods of time than their managers had expected to pay. Labor costs, initially budgeted at nearly $180,000, increased, placing new demands on the SDC for financial resources. After many legal battles, the SDC Board of Trustees had paid the overtime money to the contractors, including Ricker, Lee. [558]

Paying canal workers often proved difficult for the SDC's contractors. Many laborers, working for contractors such as the McCormick Company, seldom received more than thirty cents an hour for dangerous work involving explosives and heavy machinery near ledges, cliffs, and water.[559] Detonators often failed, causing unanticipated explosions that buried workers

[557] The Board of Trustees of the Sanitary District of Chicago "Excavation Work," *Daily Proceedings of the Board of Trustees of the Sanitary District of Chicago* (Chicago: City; of Chicago Publishers, March, 1894), 323.
[558] The Illinois Board of Canal Commissioners, "Proceedings: 4 December, 1896," 19; *The Chicago Daily Tribune*, "Hard Digging in Drainage Canal," 5 April, 1894, 3.
[559] "Drainage Canal Laborers Strike," *The Chicago Daily Tribune*, 5 January, 1893, 7.

beneath heavy layers of rock.[560] One particular 1894 explosion, in a section of ditch near Lemont, killed three workers. Although injuries were common, these were the only three laborers killed during construction operations. Ironically, poor sanitary conditions in the workers' camps also spread dysentery. Many encampments also lacked clean privy vaults and garbage receptacles.[561] Housing further undermined laborers' health and safety. Most accommodations were nothing more than wooden shacks which offered little protection from the elements or wildlife.[562] Unlike many Panama Canal workers, SSC laborers escaped other diseases including typhoid fever. Dysentery proved farm more disastrous in Chicago's case, inflicting hundreds of workers.

A twenty-page exposé in the *Tribune* detailed these horrid conditions, inciting public protest. Dangerous equipment, terrain, long hours, and low pay, prompted the contracted workers to organize.[563] According to the *Tribune*, McCormick Company told workers they would receive thirty cents an hour for their work, which was not to exceed, in normal conditions, eight hours. Many laborers often worked over thirteen hours at their thirty-cent daily wage. The SDC largely failed in handling the situation. Pay deception, lapses in oversight, and poor management angered workers who went on strike near Lockport.

The strike lasted two weeks in January of 1893 and resulted in significant changes in the SDC's operations thereafter. Although brief, the work-stoppage revealed the extent of worker dissatisfaction to the Board of Trustees. Officials, including President Frank Wenter and Chief Engineer Isham Randolph, implored contractors to provide wages in a more consistent

[560] "Explosions on the Drainage Canal," *The Chicago Daily Tribune*, 6 January 1894, 6.
[561] "Drainage Canal Laborers Strike," *The Chicago Daily Tribune*, 7.
[562] "Along the Drainage Canal," *The Chicago Daily Tribune*, 26 May, 1895, 1.
[563] "Drainage Canal Laborers Strike," *The Chicago Daily Tribune*, 7.

manner.[564] Despite protestations, SDC contractors, the McCormick company among them, failed to pay their workers in a timely fashion. The SDC also experienced difficulties in transporting privy vaults and waste receptacles to work-sites. Failures in addressing worker concerns further alienated many quarrymen.

In late-May, workers planned yet another incursion. As labor discontent spread and intensified over the next six months and unionization helped connect workers to one another, the second strike proved larger and more consequential. The scale of the diversion project and the number of striking workers attracted national media attention. The *Los Angeles Herald* and *The New York Times* sent numerous reporters to cover the event. SDC officials attempted to negotiate wages between contractors and their employees to prevent the strike. Nonetheless, worker distrust of contracted foremen made these discussions difficult. Organized quarrymen also viewed SDC leadership as disingenuous. Talks stalled and collapsed entirely, straining relations between workers and managers as the strike endured. The second incursion prompted SDC leaders to conduct weekly inspections of worker camps as a sanitation improvement measure. Work camp cleanliness represented a key complaint of canal workers and partially inspired the strike. On the morning of the strike, the SDC's Board of Trustees met and established parameters for camp inspections and issued disease maps of the area to officials near work sites. These maps displayed the areas around the construction site where work-related illnesses were most prevalent and where workers' camps experienced the worst sanitation problems. This new protocol prioritized certain areas for inspection by assessing the impact of diseases, particularly near Lockport and Willow Springs. Although sanitation represented the most pressing of laborers' concerns, safety and inadequate construction equipment constituted other important worker

[564] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 287.

complaints. Additional SDC bonds supported contractors who purchased newer technology, including cantilever conveyors, to increase worker efficiency and safety that offset initial costs.

Nonetheless, these efforts did not prevent violence from erupting between strikers, managers, and strike-breakers. Over the next six months, 2,000 unionized workers coordinated themselves between Lemont and Joliet along the southern branches of the SSC ditch. The Herald reported that the "quarrymen marched at nearly every hour of the day to protest wage-cuts and sordid conditions that inspired an additional 1,200 quarrymen to join the incursion."[565] The paper referred to the strike as a "reign of terror" in its front-page headline and made further claims about worker sobriety. According to the *Herald*, the workers were "crazed with liquor, armed with clubs and revolvers," as they marched along their picket lines. Although the staff writer working for the *Herald* briefly mentioned SDC strike-breakers, the article's author displayed a clear bias. On 9 June workers clashed with their replacements and local law enforcement officers. Governor John Peter Altgeld had ordered police to intervene and crush the strike.[566] After repeated physical confrontations between workers and state strike-breakers, Altgeld also deployed the first and second regiments of the Illinois National Guard to oppose the quarrymen.[567] With the arrival of National Guard troops on 10 June, lethal confrontations ensued. Twelve workers were injured and five more killed after soldiers fired upon the picket lines. All were immigrants. Gregor Kilka, Jakob Ignatz, Thomas Moorski, Mike Berger, and seventeen-year-old bystander, John Kluga, died in the fighting.[568] For nearly a week, the most explosive labor clash of the SSC's construction had completely stalled work.

---

[565] "A Brief Reign of Terror: Striking Quarrymen Resort to Violence," *The Los Angeles Herald*, 3 June, 1893, 1.
[566] Papers of Governor John Peter Altgeld, "Correspondence and Memoranda," *Governor's Papers of the State of Illinois, 1890-1895*, Box 1, Folder 2 (Springfield, IL: Illinois State Archives, 1893).
[567] "Strikers Come to Grief", *The Los Angeles Herald*, 10 June, 1893, 1.
[568] Papers of Governor John Peter Altgeld, "Correspondence and Memoranda: Notice of Incursion Agreement" Governors Papers of the State of Illinois, 1890-1895, Box 1, Folder 3 (Springfield, IL: Illinois State Archives, 1893)., "Much Bloodshed," *Iowa State Reporter*, 15 June, 1893, 1.

The SDC, Governor Altgeld, and independent contractors had orchestrated an agreement with workers on June 15.[569] President Wenter, once again a bastion of moderation, agreed to supply the workers with all back-payments incurred during the strike and had agreed to take a more active supervisory role in construction progress. While workers' demands were met by the Board of Trustees, oversight remained inconsistent. Quarrymen and SDC leaders welcomed the changes. With further conflicts forestalled, construction continued along a modified schedule.

Regulation and management of the canal construction was the most direct reflection of the Progressive ideological tradition since commencement of the reversal project. The reactionary attention paid to the strike reflected the disconnect between diversion's architects and those tasked with realizing engineers' plans. Control of the regional landscape and peoples living within it comprised the goal of the political, financial, and technocratic leadership that sought diversion. With further SDC oversight of the contractor-maintained camps, however, workers soon saw their wages and work-place safety improve. Conditions, nonetheless, remained rather dangerous. Despite improved worker-camp safety and cleanliness, dynamite blasts in 1894 provided a constant threat.[570] Regardless of how much reforms made canal construction safer and cleaner, excavation remained a dangerous enterprise.

Although the two incursions left a permanent change in how the SDC managed construction, work resumed with few difficulties. Between 1894 and 1896, the Board of Trustees attempted to expedite construction to make up for time lost during the strikes.[571] As construction neared completion, dredging represented only a small component of the SDC's remaining

[569] "Lemont Strike Ends," *The Chicago Daily Tribune*, 15 June, 1893, 2.
[570] "Drainage Canal Laborers Strike," *The Chicago Daily Tribune*, 7.; "Explosions on the Drainage Canal," *The Chicago Daily Tribune*, 6.
[571] "Advance on the Drainage Canal," *The Chicago Daily Tribune*, 1 January, 1895, 12.

work.[572] What remained was preparing the waterway to function at a level necessary to move Chicago's polluted waters. Efficiency was key. In addition to use of the I&M Canal as a portion of the canal trench, the SDC also constructed thirteen miles of new ditch to carry water through the SSC.[573] The material composition of each canal section differed largely based on the geological compositions that workers encountered during excavation. Some segments had bases of solid rock or concrete, while other sections of trench were lined with gravel and sand.[574] At each new section, workers installed locks and gates that regulated water level, mitigated flooding, and allowed for controlled releases from the Des Plaines River.[575] Engineers used the same process for all feeding channels involved to regulate the SSC's water-flow.[576]

Along the route, workers constructed aeration and purification works for water treatment once the canal could accept drainage. In addition to the installation of levees and aeration pumps, the SDC also ordered the construction of small concrete dams and spillways along the channel's southern sections to maintain water depth and current. Once engineers could adjust the canal's water level and flow, the SDC approved small sewage inflows to test the aeration works. This process required effluents be held in place as workers completed the main channel. The SDC also made arrangements with the City of Chicago to link the SSC to the Chicago Sewer System for rapid disposal of inner-city refuse.[577] During the early stages of construction, the SDC ordered the embedding of concrete pipes which joined the canal and sewers.[578] Building this connection to the sewer system proved convenient since the excavation process allowed workers

[572] The Illinois Board of Canal Commissioners, "Proceedings: 10 December, 1896," 25.
[573] *A Concise Report on its Organizations, Resources, Constructive Work, Methods, and Progress*, 9.
[574] Ibid., 9-10.
[575] Ibid., 75.
[576] Ibid., 76.
[577] George B. Swift, "To Aid Water Supply: Mayor Urges Swift Action From the Drainage Board," *The Chicago Daily Tribune*, 26 May, 1895, 8.
[578] *A Concise Report on its Organizations, Resources, Constructive Work, Methods, and Progress*, 8.

to place sewage tunnels in the canal ditches. This linkage made the SSC and Chicago's sewers a continuous system, thus expediting the waste-removal process. It also offered more immediate relief for some of the city's most polluted water mains and made the SSC a more complex system that provided ground-level and subterranean water movement. Adjustments made to connect the SSC with the larger canal system further cemented its pivotal role in confronting Chicago's pollution challenges.

In reversing the Chicago River, the SSC represented an environmental adaptation. Engineers radically manipulated the earth to address enormous sanitation challenges in Chicago and its hinterlands. Although the regional riverine ecology brought both crisis and prosperity to the city, the reversal harnessed this riparian landscape to assist in cleansing the city of its festering wastes. Although the Chicago River threatened to undermine the city's commercial dominance, engineers saw opportunities in area streams and portages. Throughout construction, the SDC reinforced many of the same economic and environmental linkages that Chicago had established with adjacent communities. Diversion of the Chicago River, for example, only encouraged further commercial development in the city and only enhanced the region as a transportation hub. The larger, deeper SSC also provided a convenient waste-dumping site that assuaged sanitary guilt. Reversal represented an attempt to control the landscape that also prevented the regulation of industrial pollution.

Linkages between the river, Chicago's economic rise, and its hinterland development represented historical continuity. In his landmark work, *Nature's Metropolis*, historian William Cronon discusses the intricate relationship between the urban center of Chicago and neighboring areas, arguing that Chicago could not survive without the resources transported to the city from

primarily rural areas.[579] Cronon also maintains that this relationship relied on Chicago's continued economic importance following its rise to prominence in the mid-nineteenth century.[580] The city's success, aided by the financial support and promotion of urban boosters, originated in Chicago's geographic location and its close proximity to the Portage and Lake Michigan.[581] The World's Fair also proved that this viability not only existed, but that Chicago could build upon the successes of the previous century. Political and economic dominance came only from a successful confrontation with the landscape that made Chicago attractive in the first place. The emergence of industrial pollution complicated that relationship and raised the stakes of Chicago's commercial positioning. Connections between area waterways eased the flow of pollution toward Chicago and surrounding communities.

In neighboring areas, the SSC promised to increase commercial traffic and the interference of state government in rural affairs. Many residents, however, in both Chicago and Illinois River Valley communities, believed that diversion presented a unique opportunity to improve their lived conditions. Such beliefs only raised expectations for the reversal scheme. Heightened standards initiated in the 1870s with Chesbrough's sewer, and then with Cooley's wielding of the SDC, meant that Chicagoans both blamed and celebrated those men perceived as addressing their sanitary concerns. Although the complex environmental engineering represented by the diversion project provided a unique opportunity for ecological control, the ease with which engineers could manipulate the landscape meant that citizens only expected those experts to do better. Service to residents affected by the city's pollution determined the canal's success.

[579] William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton and Co., 1991), 7.
[580] Ibid., 8-9.
[581] Ibid., 23-4.

The SSC opened on 17 January, 1900.[582] Its completion, as expected, drew local and national media attention. Questions lingered about whether the canal would work as promised.[583] Frigid temperatures threatened the opening as canal waters froze and prevented the operation of downstream locks. Workers blasted ice slabs to release over 30,000 cubic feet of water through the SSC spillways. Steady flows continued throughout the day. Peak capacity exceeded 50,000 cubic feet of water per minute (cfm) by early-morning on January 18.[584] Ice-breaking increased efficiency and the canal moved 300,000 cfm over the next two days. This was still only half of its intended volume of 600,000 cfm.[585] In stark contrast to its inauguration, the $33,000,000 canal opened unceremoniously, perhaps reflecting concerns about water flow in the winter.[586] The gradual transmission of lake and sewage water through the canal, combined with the aeration works, prevented the flooding of the Des Plaines and Illinois rivers downstream. Engineers also feared inundating Lockport and Joliet if they released the canal's entire capacity too quickly in front of a national audience.[587] The *Washington Post* reported that "probably never before has the completion of a public work of this magnitude been marked with such absolute lack of ceremony."[588] Surely the Chicago winter repelled spectators as well. Strangely, the *Post's* coverage made little mention of the weather conditions. Instead, public skepticism, political wrangling, expenses, and rural opposition were stated reasons for the subdued praise. SDC leadership admitted this in its own publications, citing "doubt and concerns upon inauguration…and troubling news reports cast a lingering cloud over the festivities."[589] While

[582] "Big Drainage Canal Open," *The Washington Post*, January, 1900, 3.; "Chicago Drainage Canal: Water of River turned into Main Channel," *The New York Times*, 2 January, 1900, 5.
[583] "Big Drainage Canal Open," *The Washington Post*, 3.; "Chicago Drainage Canal," *The New York Times*, 5.
[584] "The Drainage Canal," *The Wall Street Journal*, 6 January, 1900, 2.
[585] Ibid., 2.
[586] "Big Drainage Canal Open," *The Washington Post*, 3.
[587] Ibid., 3.
[588] "Chicago Drainage Canal: Water of River Turned into Main Channel," 5.
[589] The Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal*, 323.

the SSC certainly represented an engineering marvel, many residents, politicians, and business-leaders doubted the new waterway's ability to solve the city's problems.

Perhaps a dozen spectators joined a few SDC officials and workers in attending the canal opening.[590] Whether or not press, winter snows, or public skepticism were the likely causes for a dull celebration remains unknown. According to published SDC reports, engineers, working for the State of Illinois and the SDC, expressed uncertainty about the project's ultimate potential and advised against a large public viewing of the waterway upon its opening, especially with reporters present.[591] While no records exist revealing active discouragement of a public viewing, there seems to have been a discussion about the desirability of such a situation. The SSC, nonetheless, marked a significant achievement in civil service and environmental engineering. Completion of the drainage canal also reflected the desperation of local, state, and federal governments faced with potential political and economic doom. The channel's inauguration likely incited somber determination and apprehension; a desire to see the goal through.

Despite the SSC's inauguration, the larger canal system remained unfinished.[592] Sections near Joliet and the Illinois River confluence required additional work, including new flood gates and further dredging.[593] Flood control remained a concern for Chicago's engineers. Many of these additions demanded further SDC funding, sparking new financial and legal crises for canal officials. Few in the local media seemed surprised given the delays early in the construction process.[594] Media outlets took notice. The *Tribune* characterized these "legal challenges" facing the drainage plan as "obvious and perilous to the cause of improved drainage and commerce."

---

[590] "Big Drainage Canal Open," *The Washington Post*, 3.
[591] *The Board of Illinois Canal Commissioners*, "Proceedings of the Illinois Board of Canal Commissioners," 13 June, 1899, 28.; The Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal*, 323.
[592] *Chicago Daily Tribune*, "Report on Drainage Canal is Delayed Several Months," 14 June, 1900, 6.
[593] Ibid., 6.
[594] "Drainage Board Plans Approved: Lawyers and Others Suggest Legal Flaws, But Say River Must Be Enlarged," *The Chicago Daily Tribune*, 12 June, 1900, 12.

Right of way laws, as well as easement ordinances generated continuous litigation for SDC attorneys. As a state agency, the SDC mounted an effective defense, charging Illinois River Valley communities and other state entities for services that the SDC could not complete with its own resources.[595] Many hidden expenses included the construction of bridges used to improve the channel's accessibility to commercial and residential traffic.[596] The SDC attracted public criticism in response to these borrowing practices during the final days of work, which resembled the wasted time and money that framed the project's beginning. Criticism of the SDC and the entire process remained a permanent fixture after the reversal in 1900. Work eventually ended, nonetheless, and hopes for a cleaner city, although tempered, remained strong.

An Incomplete Success

Hopes of cleanliness did not deliver results. Initial environmental and sanitation consequences were far from certain.[597] Although prepared for shipping traffic, the larger drainage system remained incomplete. In 1900, the Board of Trustees reported that the SSC would lower lake levels, easing the passage of sewage and wastes through the waterway.[598] The SDC admitted that canal operations presented an ongoing experiment and that optimal performance might take several years. SDC officials also revealed that commercial shipping demanded a widening of the waterway to accommodate the maximum flow of 600,000 cfm from the lake. Widening and the addition of purification works needed an additional $100,000. Funding proved difficult. The United States Army Corps of Engineers (USACE) assisted and provided just over $101,000 to the SDC. USACE also offered engineering advice to complete the Chicago Harbor's sanitation works. Both parties agreed this measure helped to facilitate a

[595] The Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal*, 325.
[596] "Report on Drainage Canal is Delayed Several Months," *Chicago Daily Tribune*, 6.
[597] The Sanitary District of Chicago, *The History of the Chicago Sanitary and Ship Canal,* 326.
[598] "Give Facts on the Drainage Canal," *The Chicago Daily Tribune*, 16 June, 1900.

continuous commercial shipping line that stretched from the Mississippi River to Lake Michigan. Uninterrupted connections between Chicago and the Gulf of Mexico also served military needs, making the transportation of materiel and personnel easier.[599]

The SDC had little time to consider public response; it needed to move forward. Engineers again turned to surrounding natural waterways to bolster the city's drainage system. The SDC intended for the Calumet-Sag Canal (CSC), which flowed along Chicago's southern perimeter, to accommodate around 300,000 cfm and reverse the flow of the Little Calumet River. This smaller drainage channel would improve sanitation for residents living along the Illinois and Indiana border.[600] SDC engineers, led by new Chief Engineer William E. Worthen, built the SSC to hold around 600,000 cubic feet of water and to serve around 3,000,000 people in both Cook and Will Counties.[601] The enhanced drainage provided by the CSC managed the SSC's water level ensuring a sufficient current for waste removal. Primary excavation of the CSC began in 1896 and mirrored the SSC plan. The SDC built pumping and sanitation works along the canal route thus reversing a second river.

Completion of major improvements to the diversion system failed to assuage entrenched opposition to Illinois River Valley residents. Control of Chicago's regional ecology also served to control commercial activity in favor of the state's largest city, at least according to rural Illinoisans. Since reversal no longer represented a radical theory and instead a reality, regional criticism expanded beyond state lines. Missourians, particularly near St. Louis, strongly opposed the SSC and the diversion of wastes downstream.[602] Congressman Richard Bartholdt of St. Louis, a staunch skeptic of Chicago's business leaders and financial operations, introduced a bill

[599] Ibid., 16.
[600] *A Concise Report on its Organizations, Resources, Constructive Work, Methods, and Progress*, 9-10.
[601] Ibid., 10.
[602] "Aimed at the Drainage Canal," *The Chicago Daily Tribune*, 6.

in the US House of Representatives to investigate the SSC's water quality. The bill moved to halt construction of the SSC until the investigative committee could determine its water quality. Unfortunately for Bartholdt and his allies, the bill died on the house floor and construction continued. Federal support for diversion and the SDC made coordinated opposition in Congress politically risky. [603] The SSC, therefore, opened as scheduled despite a hearing before the Supreme Court set for April 2.[604]

The hearing involved representatives from Illinois, Missouri, and the SDC. [605] Missouri's contingent argued that Chicagoans' livelihoods and living conditions should not come at Missourians' expense.[606] The State of Illinois and the SDC argued that dilution would render sewage harmless. In a fascinating display of cynicism, Illinois' representatives also maintained that the cities of Omaha, Nebraska, and Kansas City, Missouri had similar sanitation problems. Their location on the Missouri River, which also affected the Mississippi River Valley, presented another unique pollution threat. The SDC then stated that St. Louis chose not to sue either city. Furthering their case, Illinois state attorneys claimed that Missouri did not issue its suit until the canal opened, despite knowing the SDC's intentions ten years prior. Instead, Missouri only mounted its case after the Illinois General Assembly commissioned the reversal project and set commercial shipping tolls along the Illinois River to Chicago.[607] The timing of the arguments presented by both camps proved crucial. Sanitation concerns, the explicit point of contention for Missouri's attorneys, were not corroborated with how the diversion project proceeded.

[603] Ibid., 6.
[604] Ibid., 8.
[605] "Chicago Drainage Canal Suit," *The New York Times*, 23 April, 1900, 3.
[606] "Demurs in Canal Suit," *The Chicago Daily Tribune*, 10 April, 1900, 8.
[607] Ibid., 8.

Representatives for the State of Illinois and the SDC never denied that sewage would flow toward St. Louis and, by extension, the southern branch of the Mississippi. They also never argued that their plans would not carry adverse conditions for residents living south and west of Chicago. Missouri's representatives only proffered arguments once Illinois and Chicago had secured economic revenue from use of the SSC. Financial lucrativeness remained the primary divisive item for both parties and Chicago's grip on regional commercial prosperity stood to undermine other neighboring competitors. Ultimately, the Supreme Court sided with Illinois and the SDC, citing interstate commerce. SDC representatives hoped to forestall further opposition and stated that they would implement an improved aeration system to more effectively erode wastes. Between the Supreme Court's ruling and promises of better aeration, the SSC avoided an early closure.

While the State of Illinois avoided this potential catastrophe, difficulties continued for the SDC. Local entities sparred with the agency over control of the canal. In 1913, Cooley serving as a consulting engineer, released another internal report to the Illinois General Assembly and the City of Chicago regarding one of the SSC's main feeder channels: the CSC channel on Chicago's South Side.[608] Cooley's report revealed complications with the CSC's water diversion functions.[609] The SDC intended for the channel to take additional water from Lake Michigan and divert it to the SSC to increase channel current and support the Chicago River reversal. Without enough water flow, the SSC could not dilute wastes. Additionally, the CSC would carry polluted

[608] Lyman E. Cooley, *The Calumet District: Supplement to the Brief-Diversion of the Waters of the Great Lakes by Way of the Sanitary and Ship Canal* (Chicago: City of Chicago Publishing Co., 1913), 1. This source also documents many of the Sanitary District's efforts on the South Side of Chicago from the 1880s up to the report's release in 1913. It is a useful source for information about some of the feeder canals into the Chicago Sanitary and Shipping Canal. These documents can be accessed at the Harold Washington Library in its Municipal Records collection within the Government Information division.
[609] Ibid., 1-5.; Footnotes 247-9, Ibid., 5-6.

waters from industrial areas near Blue Island, Illinois to improve water quality in far-South Side neighborhoods.

While the Chicago River no longer flowed into Lake Michigan in 1913, the CSC did not perform up to its intended standard, which allowed for further pollution in communities south of Chicago. The reversal of the Little Calumet River, much like the reversal of the Chicago River, served to divert polluted water, while also transporting clean drinking water to communities further south of the city's center. Cooley noted the presence of dense rock and glacial shift in the CSC that prevented an adequate water flow of 50,000 cfm to the SSC. Flood-control posed another issue. In 1909, Cooley documented a flood in areas near Blue Island and Morgan Park near the channel's current location. The CSC would assist in draining the swamplands located along Chicago's far southern perimeter. While not a life-threatening event, Cooley warned that this type of scenario could jeopardize property.

Population increase in the city's southern division also meant that flood-control, provided by the CSC, represented a more pressing necessity. Nearly 200,000 new residents had moved to the area in the previous five years.[610] In response, Cooley recommended additional funding to remove earthen blockages from the CSC to release more water. Cooley also suggested an enormous sum of $15,000,000 in 1910 to clear the waterway, a two-year long task. The SDC eventually agreed with the recommendations of its influential consultant and former Chief Engineer. The agency responded by clearing the channel of additional rock, mud, and silt to siphon water from Lake Michigan. Modifications to the CSC continued through 1922 and more than doubled Cooley's estimated timeframe for completion.

[610] Back of the Yards Community Organization, "Demographic Statistics," *Back of the Yards Community Collection*, Woodson Regional Library, City of Chicago Public Library, Folder 5, Box 4 (Chicago, IL: Back of the Yards Community Organization, 1928), 78.

The reversal of the Chicago River, which allowed the SDC to force sewage and pollution out of Lake Michigan, proved successful, but its effectiveness as a sanitation system remained murky. Although the SDC publicly pronounced reversal complete and "clean drinking water accessible to all residents," the drainage system seemed inadequate.[611] Pollution remained and clean drinking water scarce. By 1919, contaminated water moved through the channel at a rate of 600,000 cfm and improved the efficiency and effectiveness of Chicago's sewer system. The SDC quickly realized, however, that even after the SSC's completion, industrial production from South-Side steel mills, foundries, lumber yards, and slaughterhouses continued, unabated. Larger than ever before, Chicago's industries dumped more pollution into the reengineered Chicago River. Although none of this contamination affected downtown Chicago or Lake Michigan, problems persisted in industrial communities, particularly Packingtown.[612]

Jane Addams, the social reformer and founder of the Hull House, frequently visited Packingtown near the Union Stockyards. She later recorded her observations in *Twenty Years at Hull House*, published in 1910. Addams focused significant time and attention on Packingtown, an area located directly to the south of the stockyards. Her direct interaction with residents and first-hand observations of the South-Side's built-environment, afforded Addams with a more complex and empathetic appraisal of Chicago's most heavily polluted sectors. Here, Addams met with immigrant women, who discussed the frightening conditions of their homes and streets. Communities housing European immigrants generally lacked effective sewerage and running water. Addams remarked that it was "easy for even the most conscientious citizen of Chicago to

[611] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 348.
[612] The Chicago Sanitary District, *The Stockyards Treatment Plant*, (Chicago: City of Chicago Publishing Co., 1919), 1. Here, Packingtown largely refers to the modern-day Back of the Yards neighborhood just south of the Union Stockyards and the Chicago River. The approximate boundaries of this community are Pershing Rd. on the north with Halsted Ave. on the east and Western Ave. on the west. Garfield Blvd. constitutes the neighborhood's southern boundary. These documents can be accessed at the Harold Washington Library Center in the Municipal Records collection within the Government Information division.

forget the foul smells of the stockyards and the garbage dumps, when he is living so far from them."[613] Clearly, the stalwart activist believed that the city's detached middle-class (to which she belonged) allowed many of the challenges facing the working-class neighborhood to persist. Having observed many of Packingtown's families, Addams recalled that a woman "may sweep her own doorway in her native village and allow the refuse to innocently decay in the open air," contributing to the noxious cocktail wafting through immigrant communities. Open waste and poor sanitation spread disease and made Packingtown workers more susceptible to illness. Addams recognized the potential dangers of piling trash in the open stating that if the "garbage is not properly collected and destroyed, a tenement-house mother may see her children sicken and die."[614] Addams contended that poor housing and disease made immigrant women, not municipal officials, shoulder most of the city's sanitation burden.

Pollution, cleanliness, and infrastructure in the home concerned Addams immensely. Packingtown women, Addams claimed, had to "not only keep their own houses clean, but must also help the authorities to keep the city clean."[615] Chicago's leadership, according to Addams, had failed its citizens. Environmental conditions in Packingtown, exposed through Addams' work also revealed an important contingency regarding the extent of Chicago's rampant industrial pollution: working-class residents experienced poor water, noxious odors, and inadequate sewage removal on the job and at home. Addams' activism shows that environmental change must not only take place at waste-dumping sites, but in the home as well. That distinction reflected the core difference between social justice reformers, Addams included, and the

[613] Jane Addams, *Twenty Years at Hull House* (New York: The Macmillian Company, 1910), 185-6. This work details the majority of Jane Addams' work in Chicago through the Hull House initiative. Addams' book also describes her organizing work and offers substantial information on her political views and motivations. It is an excellent resource for Chicago history and the history of nineteenth-century American reform movements.
[614] Addams, *Twenty Years at Hull House*, 187.
[615] Ibid.

technocratic control represented by Cooley, Randolph, Wenter, and the SDC's engineering cadre. Sanitation infrastructure at the public-level garnered so much attention from experts that working-class home life went unnoticed. Addams' direct reform efforts illuminated this oversight.

Her interest in cleanliness, waste, and domestic infrastructure, however, also reveals Addams' white, middle-class persuasions---beliefs not unique to the early-twentieth century. Historian Suellen Hoy analyzes white, middle-class American obsessions with cleanliness. In *Chasing Dirt*, Hoy argues that the absence of perceived "filth," reflected an individual's success and "fitness" as citizens.[616] Hoy also contends that the maintenance of domestic cleanliness and the presentation of safe homes, free of dirt, grime, and refuse, denoted virtue. Filth, conceptually, suggested an inherent class dynamic. One could only achieve affluence if they created cleanliness. Many white, middle-class intellectuals, sanitarians, and political leaders believed that only the poorest of people, particularly immigrants and those perceived as non-white, projected filth.

Historian Carl Zimring, also examining the filth concept, argues that many Italian, Polish, Russian, and Czech immigrants lacked access to white privilege because of their perception as "filthy." During the early twentieth century, Protestant and Anglo-Saxon Americans often attached the filth moniker to many southern and eastern-European immigrants.[617] Many immigrant workers toiled in dangerous, unsanitary conditions, and exhibited poor hygiene

---

[616] Suellen Hoy, *Chasing Dirt: The American Pursuit of Cleanliness* (New York: Oxford University Press, 1995), 3. Cleanliness as a marker of inferiority also emerged in eugenic circles, particularly in California, where Mexican immigrants presented a severe perceived threat to the white social order. Cleanliness was a way to differentiate non-white immigrants and brand their citizenship illegitimate. See also: Alexandra Minna Stern, *Eugenic Nation: Faults and Frontiers of Better Breeding in Modern America* (Berkeley, CA: University of California Press, 2015).
[617] Carl Zimring, *Clean and White: A History of Environmental Racism in the United States* (New York: New York University Press, 2015), 4-5.

according to middle-class Anglo-Saxons.[618] Zimring contends that this fueled the belief that only European immigrants, and later African Americans, worked "dirty" jobs including meatpacking or sanitation.[619] Work perceived as unclean also created the idea that people who performed those jobs posed a threat to the nation. If cleanliness denoted legitimate citizenship, European and African American workers endangered the strength of the national body politic.[620]

Cleanliness differentiated immigrant communities, which they used to make claims on the illegitimacy of their citizenship. Addams' concern for immigrant cleanliness reflects her seemingly genuine desire to "save" working people, whom she described as having "little initiative," from this fate and to ensure their eventual citizenship. Melanie Kiechle, in *Smell Detectives*, documents Addams' upper-class attitudes about working-class, immigrant residents. Kiechle notes that Addams helped bring "part of a broader social settlement and municipal housekeeping movement that applied women's knowledge of domestic environs and household management to the wider urban environment."[621] That knowledge was also about framing public health assistance to those considered ignorant of foul odors and cleanliness within a white, affluent default. It is likely that Addams viewed the unsanitary conditions in Chicago's meatpacking neighborhoods as a national embarrassment, an insult to the model American citizen. Nonetheless, Addams' activism proved consequential in attempting to assist working class immigrant communities.

Meatpacking neighborhoods, many of which housed southern and eastern Europeans, remained committed to cleanliness where the city's sanitarians were not. Addams recalled that

[618] Ibid., 110.
[619] Ibid., 112.
[620] Ibid., 114.
[621] Melanie Kiechle, *Smell Detectives: An Olfactory History of Nineteenth-Century Urban America* (Seattle: University of Washington Press, 2017), 251.

many Italian workers living near the Union Stockyards, after long days on the job, returned home to litter-infested streets, sidewalks, and alleyways. During May Day celebrations, children cleaned streets to provide some semblance of cleanliness for themselves and their families.[622] Children found entertainment in picking up garbage that enveloped virtually every corner of the Packingtown area. Eventually, many European immigrants living near the Union Stockyards attached pride as well as safety to clean streets and homes.

Despite their best efforts, individual attempts to clean working-class neighborhoods failed to prevent the spread of disease. Typhoid fever and tuberculosis ravaged Chicago's working-class communities, where dilapidated wooden homes, exposed to open sewer pits, made for the easy transfer of diseases. These surroundings helped make the slaughterhouses oppressive not just in the packing plant, but at home.[623] Historian Thomas Andrews, in his work *Killing for Coal*, contends that mining companies, through environmental degradation and conscious design, created "workscapes" where laborers remained tied to the land or space that they worked. This meant that workers engaged the environment in more intimate ways while on the job. Addams might have also agreed, only that she would have emphasized the home as well. She stated that the "subtle evils of wretched and inadequate housing" constituted the "most disastrous of all societal problems."[624] Many physicians, including some women, regularly worked with the Hull House to study living conditions suffered by the city's meatpacking workers.

Dr. Alice Hamilton, who worked with Addams, compiled studies of the plumbing and "non-plumbing" that residents possessed in Packingtown.[625] Hamilton criticized the city for its

---

[622] Addams, *Twenty Years at Hull House*, 188-189.
[623] The workscape concept first appeared in: Thomas G. Andrews, *Killing for Coal: America's Deadliest Labor War* (Cambridge, MA: Harvard University Press, 2010).
[624] Quoted in: Hoy, *Chasing Dirt*, 194.
[625] Alice Hamilton, "Alice Hamilton to Mr. Foster," Philadelphia, PA: 22 May, 1911, in: Barbara Sicherman, *Alice Hamilton: A Life in Letters* (Urbana, IL: University of Illinois Press, 2003), 160.

failure to adequately respond to sanitation issues. Claiming that "municipal leaders were negligent in their responsibilities," Hamilton suggested that the city and local residents in meatpacking neighborhoods "wash streets daily to prevent the spread of tuberculosis and other devastating diseases."[626] The Commissioner of Public Works supported street washing, but "devoted only minimal funding to the endeavor."[627] Disease was worse near the Union Stockyards and both Addams and Hamilton blamed the same industries that made Chicago wealthy.

Wretched Packingtown conditions attracted national media attention. Editors at the *Lexington Herald* reported that the Office of the Commissioner of Public Works simply refused to dump sewage near the city's most "exclusive districts."[628] Noting the clear distinction between dumping in Lithuanian, Polish, and Italian communities, reporters concluded that "poor sewerage constituted discrimination" against working-class immigrants.[629] Rather than depositing wastes in many of the more affluent North Side neighborhoods, the article accuses both slaughterhouses and city leaders of making the "deliberate choice to discard refuse" near immigrant communities.[630] It is also possible that meatpacking companies dumped wastes near working-class neighborhoods because the Chicago River, reversed by the new SSC, flowed nearby. Acting as a ground-level drain, the SSC likely reinforced the logic of dumping waste in impoverished areas. Reversal's engineers, which touted the effectiveness of the SSC to promote their own legitimacy, only convinced industries that dumping in the Chicago River was as harmless as ever.

---

[626] Ibid.,"Wants City Streets Washed: Dr. Alice Hamilton Suggests Methods of War," *Chicago Daily Tribune*, 17 January, 1909. This article appeared nine years to the day from the opening of the SSC.
[627] "Evans for Washed Streets: Commissioner Likes Dr. Hamilton's Suggestion, Expense is the Obstacle." *Chicago Daily Tribune*, 18 January, 1909, 3.
[628] "Noted Settlement Worker Speaks Here Tuesday Night," *Lexington Herald*, 23rd May, 1909, 1.
[629] Ibid.
[630] Ibid., 2.

Nonetheless, Addams proclaimed that the "wretched sanitary appliances through which alone infection could have been permitted to remain," was the result of "municipal negligence." Declaring that Chicago's leadership possibly had ulterior motives, Addams charged that the "city inspector had either been criminally careless or open to the arguments of the favored landlords."[631] Addams believed that the wealthy real estate moguls had bought the municipal leadership to prevent dumping in affluent areas.

Writing passionately about the plight of the city's immigrant working communities, Addams proposed corruption as a potential explanation for the city's transgressions. While recognizing the class-divisions reflected by poor housing and sanitation, Addams offered no analysis about the ethnic prejudice that immigrant workers faced. Although Addams' work at the Hull House provided some necessary services to working-class immigrants, she possessed some of the same ethno-centric biases harbored by many middle-class reformers of the era. Historian Michael McGerr in *A Fierce Discontent* would emphasize these affluent assumptions as the comprehensive summation of Addams' character. Her exposure of technocratic failure, however, and advocacy of direct community assistance is a profound departure from many contemporaries with similar socio-economic origins. Packingtown residents experienced many of the same conditions they did prior to diversion. Her Hull-House efforts differed from the technocratic reform exhibited by Chicago's sanitarians. Technocratic reformers and industrialists sought to bolster their own legitimacy; their right to bestow "progress" upon a needy populace through monumental engineering projects that extolled expertise rather than offer direct assistance to those closest to pollution. By contrast, Addams illuminated conditions inherent to working-class life; she cared about what vulnerable Chicagoans needed, the source of her concern

[631] Hoy, *Chasing Dirt*, 196.

notwithstanding. Given that Addams' work was necessary reveals the limitations of the reversal's technocratic "achievement."

While SDC transcripts engage little with the city's reformists, the popular sentiment articulated by Addams, Hamilton, and expressed in newspapers, created enough pressure for a response to the Packingtown situation. Mirroring their earlier procedures, the SDC submitted another assessment of polluted water near the Union Stockyards which generated a major portion of the city's economic output in the early twentieth century.[632] Effluents flowing through the SSC, mostly as a result of industrial dumping, caused continued challenges for Chicago's strained sanitation system. Despite a successful diversion of the Chicago River, the "foul smells and odors emanating from the city's southern sector" did not flow downstream so quickly[633] The SDC correctly identified the Union Stockyards as Chicago's largest polluter. More importantly, however, the SDC's report reflects an important recognition that the sanitation community to date, either ignored or denied. That realization was that even the most advanced American engineering efforts ignored industrial waste dumping. As CAC member John C. Ambler learned twenty years earlier, Chicago's sanitation problems would remain unvexed unless those dumping waste suffered consequences for it. Instead, the SDC simply moved wastes elsewhere. Although engineers viewed the SSC as a permanent solution to the city's sanitation woes, the meat-packing industry seemed just as immovable.

For the first time in 1919, the SDC considered attacking pollution at its largest source. Prior to the First World War, South-Side industries stalled slightly, decreasing the rate of waste-dumping.[634] Once the war ended and the population in Chicago exploded following the Great

[632] Ibid., 1.
[633] *The Citizens' Association of the Chicago*, "Smells" (Chicago, Hazlett and Reed Publishers, 1875), 29.
[634] *The Stockyards Treatment Plant*, 8.

Migration, meat-packing and other industries returned and resumed sewage-disposal into the Chicago River.[635] SDC engineers noted the festering garbage in the South Fork of the Chicago River, known as "Bubbly Creek."[636] While the SSC removed large amounts of waste and sewage from Lake Michigan, packing companies, specifically Armour and Swift, used the small stream as a sink. This practice created near-uninhabitable living conditions characterized by foul odors from fecal matter, decaying animal carcasses, and large amounts of coagulated, standing sewage.[637] The waters of the stream bubbled from the standing wastes. Although the Chicago River reversal largely succeeded, most of the effluent in Bubbly Creek remained stagnate after the reversal.

The SDC's proposed solution was to build a new water treatment plant near the Union Stockyards. Meatpacking engineers formed a joint committee with SDC sanitation officials at the conclusion of the First World War to identify the types of waste in the South Fork and how best to eliminate them. Both parties encouraged a collaborative effort to evoke a cooperative image to a public weary of technocratic scheming. Dilution had no effect on pollution dumped in Bubbly Creek as the stream flowed north toward the Chicago River's South Branch. Sewage snaked, undiluted, into the SSC. As wastes collected in Bubbly Creek, sanitary conditions near the Union Stockyards worsened, threatening the SDC's control of its drainage system. Federal authorities from USACE applied intense pressure on the agency to solve a problem it proclaimed to no longer exist.

[635] Ibid., 8.
[636] Ibid., 2. Here, the District refers to both the formal name of the stream (The South Fork of the South Branch Chicago River), and Bubbly Creek. For the sake of brevity, this work will use "South Fork" and "Bubbly Creek" interchangeably.
[637] Ibid., 2-4.

The joint committee of SDC and packing-house engineers considered several solutions to address a problem rapidly threatening the rehabilitated image they had worked hard to achieve. Direct water treatment represented the committee's final decision.[638] Prior to entering the SSC-system, water treatment works would introduce cleaning agents to chemically dilute sewage where mechanical dilution proved inadequate. Nonetheless, both groups believed that Lake Michigan water levels might provide further dilution.[639] Local media and some residents doubted this specific solution stating that lake levels, which declined following the reversal, might also decrease the SSC's current.[640] Such a result would render mechanical dilution ineffective. The SDC's Board of Trustees requested that the Corps empty water from the St. Lawrence and the St. Claire Rivers to increase Lake Michigan's water level.[641] Additional inflows would then raise the SSC's current, enhancing mechanical dilution.[642] The Corps disagreed, concluding that this strategy would not move enough water to dilute Packingtown waste.[643] Chicago's sanitary community faced a nearly identical problem as it did twenty years earlier and recapitulated nearly identical solutions. Not only had the city's new riverine sewer proved incomplete, it remained inadequate. Regulation of Chicago's slaughterhouses never garnered significant attention from sanitarians.

Ultimately, federal officials, working both for USACE, and the Commerce Department instructed the SDC to build its Packingtown Water Treatment Plant.[644] The federal government had expressed its explicit support for chemical dilution. Accompanying this measure, SDC engineers closed a section of Bubbly Creek creating a small retention pond at the southern end of

[638] Ibid., 4.
[639] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 323.
[640] *The Stockyards Treatment Plant*, 4.; "Gives Facts on Drainage Canal," *The Chicago Daily Tribune*, 16.
[641] *The Stockyards Treatment Plant*, 4.
[642] "Gives Facts on Drainage Canal," *The Chicago Daily Tribune*, 16.
[643] *The Stockyards Treatment Plant*, 4.; Washington, *Packing Them In,* 130.
[644] The Sanitary District of Chicago, *History of the Chicago Sanitary and Ship Canal*, 325.

the stream for chemical dilution. To divert more water through the SSC, and to assist in treating the creek's water, the SDC revisited an earlier goal: widening the SSC and merging it with the I&M Canal. The three waterways appeared this way in 1899:

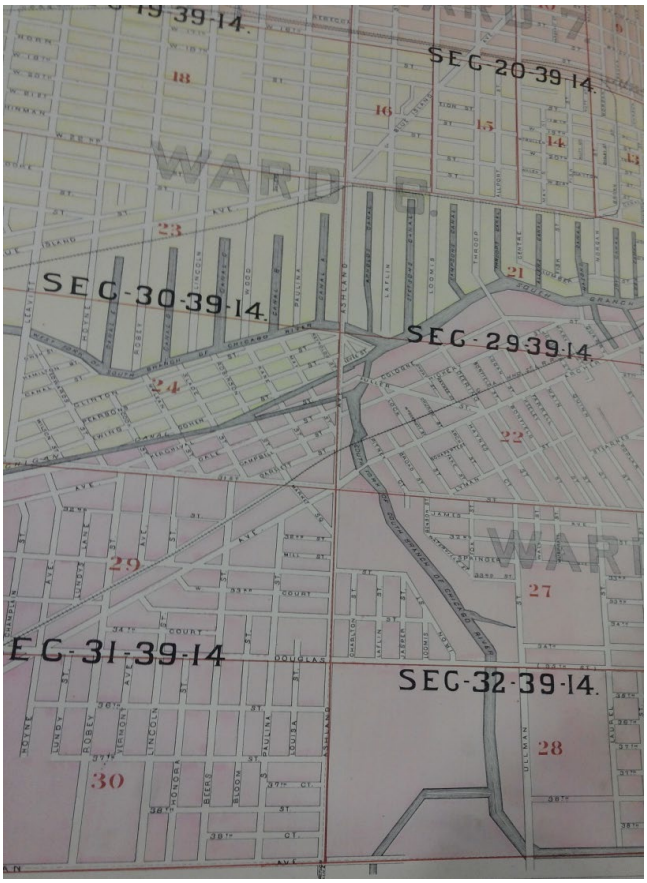


Figure 12: South Fork of the South Branch of the Chicago River showing the connection with the Chicago River and the I&M Canal (1886). Map Courtesy of the Newberry Library.

The I&M Canal originally flowed directly into the SSC from the south west. The South Fork then split off into two smaller streams and drifted due south (See Figure 9).[645] After the SSC's widening, the SDC moved the drainage channel into the I&M Canal's original path. The SSC

[645] E. Robinson, *Robinson's Atlas of the City of Chicago, Illinois, Vol. II* (Washington D.C., Office of the Librarians of Congress, 1886), 1. Image courtesy of the Newberry Library in Chicago, Illinois, Special Collections, Cartographic Collections.

was, therefore, positioned on top of the original I&M Canal.



Figure 13: Contemporary Satellite Image of the South Fork South Branch Chicago River. All of the original areas that provided the source of the I&M Canal have been completely filled. Image courtesy of Bubbly Creek Framework Plan.

The above image (Figure 13) reveals the result of the SSC widening and its confluence with the channel and the South Fork near the Union Stockyards.[646]

Widening generated a stronger current and brought additional water from Lake Michigan to increase flow and achieve mechanical dilution. Stronger currents in the SSC served as a supplement to chemical dilution introduced by the Packingtown Water Treatment Plant.[647] Once the widening efforts concluded, the I&M Canal ceased to exist in this part of Chicago. Instead, it

[646] Image courtesy of: Google-www.site-design.com. Bubbly Creek Framework Plan. This site contains information regarding private initiatives to revitalize the Union Stockyards area and contains maps and old photographs of the area particularly with contemporary images of the South Fork of the South Branch Chicago River.
[647] *The Stockyards Treatment Plant*, 8.

flowed directly into the SSC. SDC engineers replicated the reversal project on a smaller scale with Bubbly Creek, utilizing its retention pond to dilute wastes and pump treated water into the SSC for removal.[648] Public funding of the project provided financial support for both the water-treatment plant and the South Fork retention pond. Once completed, the work fetched a $250,000,000-price tag and industrial meatpackers escaped accountability. Conditions in Packingtown and other industrial neighborhoods improved only when the largest packing companies left the city in 1954. The Chicago River's water quality gradually improved thereafter.

Conclusion

Living conditions experienced on Chicago's South Side is a part of the Chicago River story that demands further consideration. Ineffective sanitation that lingered in the city's poorest neighborhoods, which, by the 1950s had become home to large African American communities, represents the stark limitations of the reversal project. Chicago's most vulnerable citizens remained underserved by the diversion project. While civic leaders, politicians, industrialists, and technocratic professionals cast the SSC project as a resounding achievement.[649] From an engineering perspective, such a characterization is accurate. It is important, however, to consider who this achievement served. Clearly, the SSC improved drinking water quality in Chicago and surrounding communities. Access to potable water also expanded and sanitarians possessed more effective methods to remove sewage from city streets. The canal, itself a form of technological innovation, diluted and transported pollutants out of Lake Michigan and away from contaminated neighborhoods. The entire country, as evidenced by national media coverage of the canal's construction, reveled in the achievement it presented. In the age of rail, an engineered

[648] Ibid., 8-10.
[649] The Sanitary District of Chicago, *History of the Chicago Sanitary and Shipping Canal*, 427.

waterway took center-stage. The reversal of the Chicago River was the largest earth-moving project in American history and remains the only example of a successful river reversal in world history. The canal succeeded and fulfilled many of the goals outlined by the SDC at its founding in 1889: the improvement of sanitation and the facilitation of effective commercial transportation.[650]

Sanitary improvement represented only a secondary objective for the SDC. Commercial prosperity, and the manipulation of Chicago's regional ecology to foster that prosperity, marked the reversal project's true purpose. Despite these apparent victories, the SSC did not completely solve the issues many hoped it would. The SDC and the Illinois elected officials, sought to eliminate pollution and ensure the public witnessed this achievement. Viewing the waterway as an engine for public health and service, the SDC's Board of Trustees believed their sanitation strategy the ultimate answer to many of the city's problems. That belief is apparent in reports and histories that the SDC released about its work.[651] Local, state, and federal cooperation also framed this belief and helped realize an entrenched faith in technology. The SSC, although offering a drain for the polluted Chicago sink, merely moved sewage, and failed to address industrial waste dumping. The SSC fought pollution and created a complex, new riverine system. Nonetheless, it did little to improve the lives of working-class Chicagoans.

[650] *The Stockyards Treatment Plant*, 1919, 1. It is important to note that much of the commercial shipping traffic in Chicago today, travels on the Sanitary and Ship Canal.
[651] The Sanitary District of Chicago, *History of the Chicago Sanitary and Shipping Canal* (Chicago: City of Chicago Publishers, 1924), 425.

Epilogue

This dissertation has presented an analysis of technocratic reform; the faith in the ability of trained professionals, skilled in the usage of technological innovation, to improve citizens' quality of life. Expertise and knowledge, exhibited by engineers from Ellis Chesbrough to Lyman E. Cooley, revealed not just a system of faith based on systematic training, but also a legitimacy; a right to wield that training. The reversal of the Chicago River represented a powerful example of this faith. Once thought impossible by Chesbrough, an individual who designed the city's first sewer system and raised Chicago ten feet, Cooley realized the only example of a river diversion in history. Such an accomplishment belied the trust in technocrats from public officials, in rural Illinois and Chicago, to regulate society and nature. As this dissertation has illustrated, those projects almost always occurred without consideration for the needs of those most vulnerable to the problems being addressed. The reversal defended the commercial interests of industrialists. Only when rural opponents threatened Chicago's economic standing did technocrats listen. Technocracy offered a very specific and limited type of reform. Environmental interaction, including the reversal, reflects social interaction. Human engagement with their surroundings, whether built or ecological, reveals how humans view one another. The reversal reflected the commercialization of the landscape and of workers who lived amidst the same pollution that necessitated the SSC.

Sanitarians, the engineers tasked with improving health and hygiene, led a massive infrastructure project that reversed the Chicago River and allowed the city to maintain its commercial preeminence while improving water quality. Pollution in the Chicago River presented the city with its most bitter sanitation and public relations problem. As Chicago industrialized during the 1850s and its population exploded, waste disposal proved a daunting

challenge.[652] Railroads facilitated the arrival of lucrative industries including tanneries, brick mills, breweries and meatpacking plants. Trains also allowed ranchers to transport cattle, in large numbers, over long distances from the Great Plains north and east to Chicago. This process generated tremendous wealth for city boosters and investors. Public officials, leery of obstructing the financial growth of an increasingly profitable metropolis, allowed industries to dump their waste in the Chicago River. Pollution produced a powerful stench near South-Side meatpacking plants and contaminated drinking water from Lake Michigan. Failed sanitation systems allowed for the coagulation of moist animal flesh, fecal matter, acid, and festering garbage in the small, slowly moving stream.[653] To ensure Chicago's financial preeminence, the city required a radical cleansing of a deeply contaminated ecology.

Despite this accomplishment, pollution enveloped working class neighborhoods as industrial production continued unabated. Clean water constituted the primary problem in many of the city's neighborhoods prior to the river reversal, and while the diversion mitigated that problem, poor drainage, sewerage, and access to potable water lingered. Even after the project's completion, district officials realized that the waste generated by the city's meatpacking industry continued to find its way to the reengineered Chicago River.[654] Public officials sought to give residents a cleaner city, but their reluctance to regulate industry made living conditions difficult long after the river's reversal. Although the SSC marked a significant achievement in environmental engineering, it only encouraged further dumping of packinghouse wastes.[655] This

[652] For a study of rapid industrialization and associated sanitation problems see: Harold Platt, *Shock Cities: The Environmental Transformation and Reform of Manchester and Chicago* (Chicago: University of Chicago Press, 2005).
[653] Upton Sinclair, *The Jungle* (New York: Penguin Classics, 1985), 328.
[654] Ibid., 424-427.
[655] "Chicago Drainage Canal: Water of River turned into Main Channel," *The New York Times*, 2 January, 1900, 5.

pollution prompted a fierce reform movement that demanded the city make further sanitation improvements.

The canal framed the commercial and sanitary character of the city during the twentieth century. Reversal succeeded in the most practical ways possible: it moved sewage and slaughterhouse wastes out of the city, while diluting them and improving water quality for many residents. The SSC, however, failed to achieve another stated goal of SDC leaders – establishing cleaner living conditions in Chicago's working-class neighborhoods – largely because of the unwillingness of municipal leaders to address the complex root causes of poverty in an industrializing America. Consequently, the reversal united the seemingly divergent economic interests of rural Illinois and Chicago, creating a complex commercial system that spanned an entire region. Sanitation remained a secondary goal. Although the canal addressed some sanitary concerns, drinking water chief among them, it required further improvements after it opened for traffic. Both the SSC and the Chicago River reversal were two steps in a larger sanitation strategy designed to provide city residents with clean water and living conditions. The new riverine system established by the SSC succeeded in pulling large amounts of pollution out of Lake Michigan, which allowed for a cleaner supply of municipal water. Although the presence of improved water quality, in many areas of the city, constituted a significant success for Chicago and its leaders, the reversal reflected the overarching importance of defending regional commerce.

The SSC remains a relevant topic for scholarly consideration. As the Asian carp present an ongoing dilemma for the Great Lakes region, entrepreneurs and urban planners continue to wrestle with the city's complex environment.[656] Recreational use has emerged as the most recent

[656] Tom Henry, "Notre Dame on Front Lines in War against Asian Carp," *The Toledo Blade*, 8 March, 2015, www.toledoblade.com, accessed, 10 March, 2015.

opportunity to re-make and re-use the Chicago River. The University of Notre Dame is leading the current assault on the carp to defend the Chicago River and the Great Lakes region from the invasive fish. Tourism has emerged as a major motivation for more effective solutions.[657] Developing the use of environmental DNA ("eDNA"), university researchers found a more accurate way of tracing the carp's movement, which could contain their populations to specific areas where they can be systematically killed, or captured, with electrocution or holding pens.[658] Once again, the SSC is poised to provide a solution to an expensive human-made environmental challenge; the carp have cost more than seven billion dollars in lost time and goods.[659]

Many states in the Great Lakes region, including Ohio, Michigan, and Illinois, view the irritating presence of the fish as an economic threat. Nonetheless, the SSC remains open. The carp reveals the intricate and unforeseen interactions between people and their surroundings not always apparent when civil endeavors, the SSC included, are being considered. Public officials do not always contemplate the future implications of their work. Demands for rapid change from lawmakers, business-leaders, and residents make thorough evaluations difficult. Neither Chesbrough nor Cooley could anticipate ecological changes considered impossible during their work. The Asian carp story shows this. Environmental adaptation, first in Chicago and then along the Mississippi, created an unintended ecological exchange that demanded further confrontation. The SSC diverted pollution and improved Chicago's water quality; perhaps it will help remove the Asian carp. Either way, city officials seem determined to try.[660]

---

[657] Michael Hawthorne, "Chicago River Cleanup Makes Waterway Safer for Recreation," *Chicago Tribune*, 21 March, 2016, 2.
[658] Henry, "Notre Dame on Front Lines in War against Asian Carp," *The Toledo Blade*.
[659] Ibid.
[660] Ibid.

Providing clean living conditions and distributing the fundamental necessities of life are essential goals of any city or society. The SSC represents a monumental attempt to establish that security. Today, the canal remains open and an integral aspect of Chicago's landscape. The river reversal project helped Chicago transition from a regional transportation hub to an economic capital of national and international significance. What the SSC reflects is the city's historic commitment to advanced public works projects in attempt to regulate nature and defend commerce. The reversal of the Chicago River also serves as an important reminder of the resilience of the natural environment. People cannot control or fully regulate nature. As adaptations continue, new conditions emerge that require different adaptations. Riverfront development and river sport usage also reflect past confrontations with inequity often connected to pollution. Affluent, mostly white North-Side neighborhoods stand to benefit from such development. The South Branch of the river, by contrast, remains mostly a site of industry and contamination.[661] Former Mayor Rahm Emmanuel seemed positioned to continue in the tradition of Chesbrough, Cooley, and Daniel Burnham in making "no small plans." The Chicago River represents an evolving site of social, commercial, and environmental confrontation.

[661] Kari, Lydersen, "In Chicago, A River Revitalized—but Not for Everyone," *The Washington Post*, 22 June, 2019, washingtonpost.com—accessed: 28 June, 2019.



Bibliography

Manuscripts and Government Documents

Harold Washington Library Center-Chicago Public Library System

Back of the Yards Community Collection

Chicago City-Wide Collection

Chicago Sewers Collection

Municipal Records

Special Archives and Collections

Chicago Historical Society at the Chicago History Museum

Amalgamated Meat Cutters and Butcher Workmen of North America Records (1953-7)

Mary McDowell Papers

Ethelbert Steward Collection

Swift and Company Records (1879-1954)

Ellis Chesbrough Papers

Minutes of the Civil Engineers Club of the Mississippi Valley (1867-80)

World's Columbian Exposition Collection

Newberry Library

General Collections

Maps and Modern Manuscripts Collection

Special Collections

Illinois State Archives at the Illinois State Library

Illinois State Governor's Papers

Illinois and Michigan Canal Commissioners

Minutes of the Chicago City Council

Records of the Illinois State Supreme Court

Abraham Lincoln Presidential Library

Regional Newspaper Collection

Primary Documents

Amalgamated Meat-Cutters' and Butcher Workmen of North America. *Twenty-Second General Convention*. San Diego: A Amalgamated Meat-Cutters' and Butcher Workmen of North America. 8 July, 1968.

Anonymous. *Biographical Sketches of Chicago's Leading Men*. Chicago: 1867

Andreas, A.T. *History of Chicago: From the Earliest Period to the Present Time, Vol. I.* Chicago: A.T. Andreas, Publisher, 1884.

Ansley, G.D. *Minutes and Proceedings of the Society of Civil Engineers*, "City Drainage." Chicago: American Society of Civil Engineers, Paper delivered on 1 April, 1879.

Baly, Chas. *Proceedings of the Board of Trustees of the Sanitary District of Chicago*. "First Regular Meeting." City of Chicago, 2. February, 1890.

Chesbrough, Ellis. *Minutes and Proceedings of the Civil Engineers Club of the Northwest*, "Report of the Committee on Drainage." Chicago: The Civil Engineers Club of the Northwest, 1 July, 1878.

The Citizens' Association of Chicago. *The Annual Report of the Citizens' Association of Chicago*. Chicago: Hazlett and Reed, Printers and Publishers, 1877.

Citizens' Association of Chicago. "Main Drainage." Chicago: Hazlett and Reed Printers. November, 1881.

Citizens' Association of Chicago. "Ship Canal." Chicago: Hazlett and Reed Printers. October, 1880.

The Chicago Sanitary District. *History of the Chicago Sanitary and Shipping Canal*. Chicago: City of Chicago Publishers, 1924.

Cooley, Lyman E. *The Calumet District: Supplement to the Brief-Diversion of the Waters of the Great Lakes by Way of the Sanitary and Ship Canal*. Chicago: City of Chicago Publishing Co., 1913.

----------. *The Lakes and Gulf Waterway: As Related to the Chicago Sanitary Problem-The General Project of a Waterway from Lake Michigan to the Gulf of Mexico: In Respect to the Chicago Terminus, Physical Features of the Route, Character of the Project, its Utility, and the Methods of its Accomplishment-A Preliminary Report with Appendices, Maps, and Profiles*. Chicago: Press of John W. Preston, 1888.

Greeley, Samuel S. "The Riparian Question: A Paper Delivered Before the Civil Engineers Club of the Northwest," *Meeting Minutes of the Civil Engineers Club of the Northwest*. Chicago: Chicago Historical Society, 7 February, 1876.

Harman, W.M. *Proceedings of the Board of Trustees of the Sanitary District of Chicago*. "Proceedings." City of Chicago. 8, December, 1891.

The Thirty-Sixth Illinois General Assembly. "The Farm Drainage District Dissolution Act." 4 June, 1889." *Laws of the State of Illinois*. Springfield, IL: General Assembly of the State of Illinois, H.W. Rokker, Printer and Binder, 1889.

The Thirty-Sixth Illinois General Assembly. "Illinois Waterways and Drainage Act, 4 June, 1889." *Laws of the State of Illinois*. Springfield, IL: General Assembly of the State of Illinois, H.W. Rokker, Printer and Binder, 1889.

Magnin, Antoine. *Bacteria*. New York: W. Wood and Company, 1884.

Rauch, John H. *Proceedings of the Sanitary Council of the Mississippi Valley*, "Address of May 24, 1879." Chicago: City of Chicago Publishers, 1879.

Richard Prendergast. *Proceedings of the Board of Trustees of the Sanitary District of Chicago*. "Daily Proceedings." 11 July, 1890.

Richard Prendergast. *Proceedings of the Board of Trustees of the Sanitary District of Chicago*. "Daily Proceedings." 12 November, 1891.

Richard Prendergast. *Proceedings of the Board of Trustees of the Sanitary District of Chicago*. "Drainage Board." 27 November, 1891.

Sanitary Council of the Mississippi Valley, "Address of the Committee on General Sanitation." Hamilton, OH: Democrat Job Rooms Print, 1880.

Sanitary Council of the Mississippi Valley. "Address of the Committee on General Sanitation." Hamilton, OH: Democrat Job Rooms Print, 1883.

Sanitary Council of the Mississippi Valley. "Inaugural Report." Hamilton, OH: Democrat Job Rooms Print, 1882.

The Sanitary District of Chicago. *A Concise Report on its Organizations, Resources, Constructive Work, Methods, and Progress*. Chicago: City of Chicago Publishers, 1895

The Sanitary District of Chicago. *The Stockyards Treatment Plant*. Chicago: City of Chicago Publishing Co., 1919.

The Sanitary District of Chicago. *A History of the Chicago Sanitary and Ship Canal*. Chicago: City of Chicago Publishers, 1922.

Interviews and Correspondence

Burke, Betty. "Interview." *WPA L.C. Project Writers' Unit*. Washington D.C., Library of Congress. 10 October, 1940.

Memoirs

Addams, Jane. *Twenty Years at Hull House*. New York: The MacMillan Company, 1912.

Newspapers

Alexandria Gazette, 1830-1860.

The Augusta Chronicle, 1830-1850.

The Back of the Yards Journal, 1920-70.

The Chicago Daily Democrat, 1840-1860.

The Chicago Daily Tribune (later *The Chicago Tribune*), 1880-1900.

The Chicago Defender, 1900-1910.

The Chicago Record-Herald, 1880-1910.

The Daily National Intelligencer, 1830-1850.

The Lexington Herald, 1880-1900.

The Los Angeles Herald, 1890-1900.

The Los Angeles Times, 1890-1900.

Milwaukee Sentinel, 1850-1870.

Mississippi Free Trader, 1830-1860.

The New York Evening Post, 1830-1860.

The New York Times, 1880-2010.

The Ottawa Plain-Dealer, 1880-1900.

The Peoria Journal, 1880-1900.

The Toledo Blade, 2009-15.

The Wall Street Journal, 1880-1900.

The Washington Post, 1880-1900.

Weekly Wisconsin Patriot, 1850-1870.

Periodicals

"Chicago," *Scribner's Monthly*, Vol. 10, 5. September, 1875.

Literature

Sinclair, Upton. *The Jungle*. New York: Doubleday Publishing, 1906.

Maps

E. Robinson, *Robinson's Atlas of the City of Chicago, Illinois, Vol. II*, (Washington D.C., Office of the Librarians of Congress), 1886,

Secondary Sources

Books

Amy D. Alberts and Michael P. Conzen. *Looking for Lemont: Place and People in an Illinois Canal Town*. (Studies on the Illinois and Michigan Canal Corridor). Chicago: University of Chicago Press, 1994.

Andrews, Thomas. *Killing for Coal: America's Deadliest Labor War*. Cambridge, MA: Harvard University Press, 2010.

Barrett, James. Work *and Community in the Jungle: Chicago's Packinghouse Workers, 1894-1922*. Urbana: University of Illinois Press, 1987.

Barnett, William, Kathleen Brosnan, and Ann Durkin Keating. *City of Lake and Prairie: Chicago's Environmental History*. Pittsburgh, PA: University of Pittsburgh Press, 2020.

Bederman, Gail. *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917*. Chicago: University of Chicago Press, 1996.

Bellich, James. *Replenishing the Earth: The Settler Revolution and the Rise of the Anglo- World, 1783-1939*. New York: Oxford University Press, 2011.

Biggs, David A. *Quagmire: Nation-Building and Nature in the Mekong Delta*. Seattle, WA: University of Washington Press, 2012.

Blight, David W. *Race and Reunion: The Civil War in American Memory*. Cambridge, MA: Harvard University Press, 2009.

Blum, Elizabeth. *Love Canal Revisited: Race, Class, and Gender in Environmental History*. Lawrence, KS: The University Press of Kansas, 2008.

Brosnan, Kathleen. *Uniting Mountain and Plain: Cities, Law, and Environmental Change Along the Front Range*. Albuquerque, NM: University of New Mexico Press, 2002.

Brinkley, Alan. *The End of Reform: New Deal Liberalism in Recession and War.* New York: Vintage Books, 2011.

----------. *Liberalism and its Discontents*. Cambridge, MA: Harvard University Press, 1998.

Bullard, Robert. *Dumping in Dixie: Race, Class, and Environmental Quality*. New York: Routledge, Third Edition, 2000.

Calhoun, Charles W., ed. *The Gilded Age: Perspectives on the Origins of Modern America* Lanham, MD: Rowman & Littlefield Publishers, 2007.

Carr, Kay J. and Michael Conzen. *The Illinois and Michigan Canal National Heritage Corridor*. De Kalb: University of Northern Illinois Press, 1988.

Chandler, Alfred D. *The Visible Hand: The Managerial Revolution in American Business*. Cambridge, MA: Harvard University Press, 1993.

Cioc, Mark. *The Rhine: An Eco-Biography, 1815-2000*. Seattle, WA: University of Washington Press, 2006.

Clark, Claudia. *Radium Girls: Women and Industrial Health Reform, 1910-1935*. Chapel Hill, NC: University of North Carolina Press, 1997.

Cohen, Adam. *Imbeciles: The Supreme Court, American Eugenics, and the Sterilization of Carrie Buck*. New York: Penguin Books, 2017.

Cohen, Lizabeth. *Making a New Deal: Industrial Workers in Chicago, 1919-1939*. New York: Cambridge University Press, 1991.

Conzen, Michael P. *Illinois Canal Country: The Early Years in Comparative Perspective*. Chicago, 1991.

---------- and Andrew R. Daniel, eds., *Lockport Legacy: Themes in the Historical Geography of an Illinois Town* (Studies on the Illinois and Michigan Canal Corridor). Chicago: University of Chicago Press, 1990.

---------- and Melissa J. Morales, et.al., *Settling the Upper Illinois Valley: Patterns of Change in the I&M Canal Corridor, 1830-1900* (Studies on the Illinois and Michigan Canal Corridor). Chicago: University of Chicago Press, 1989.

---------- and Diane Dillon, eds. *Mapping Manifest Destiny: Chicago and the American West*. Chicago: Newberry Library, 2008.

Cooper, John Milton. *Pivotal Decades: The United States, 1900-1920* New York: W.W. Norton, 1990.

Cronon, William. *Nature's Metropolis: Chicago and the Great West*. New York: W.W. Norton and Co., 1991.

Davis, Mike. *Ecology of Fear: Los Angeles and the Imagination of Disaster*. New York: Vintage Books, 1999.

DeBevoise, Ken. *Agents of Apocalypse: Epidemic Disease in the Colonial Philippines*. Princeton, NJ: Princeton University Press, 1995.

Deverell, William and Tom Sitton. *Water and Los Angeles: A Tale of Three Rivers, 1900-1941*. Berkeley, CA: University of California Press, 2016.

----------. *Whitewashed Adobe: The Rise of Los Angeles the Remaking of its Mexican Past*. Berkeley, CA: University of California Press, 2004.

Diggins, John P. *The Proud Decades: America in War and in Peace, 1941-1960* New York: W.W. Norton, 1988.

----------. *The Rise and Fall of the American Left* New York: W.W. Norton, 1992.

Downs, Jim. *Sick from Freedom: African American Illness and Suffering during the Civil War and Reconstruction*. New York: Oxford University Press, 2012.

Dumenil, Lynn. *The Modern Temper: American Culture and Society in the 1920s*.

Dunlap, Thomas. *DDT: Scientists, Citizens, and Public Policy*. Princeton: Princeton University Press, 1981.

Einhorn, Robin. *Property Rules: Political Economy in Chicago, 1833-1872*. Chicago: University of Chicago Press, 1991.

Elkind, Sarah S. *Bay Cities and Water Politics: The Battle for Resources in Boston and Oakland* Lawrence, KS: University of Kansas Press, 1998.

----------. *How Local Politics Shape Federal Policy: Business, Power, and the Environment in Twentieth-Century Los Angeles*. Chapel Hill, NC: University of North Carolina Press, 2011.

----------. *Public Works and Public Health: Reflections on Urban Politics and the Environment.* New York: Public Works Historical Society, 1999.

Fairclough, Adam. *A Class of Their Own: Black Teachers in the Segregated South*. New York: Belknap Harvard University Press, 2007.

Flanagan, Maureen. *American Reform: Progressives and Progressivisms, 1890s-1920s*. New York: Oxford University Press, 2006.

Foner, Eric. *Reconstruction: America's Unfinished Revolution, 1863-1877*. New York: Harper Collins Classics, Updated Edition, 2014.

Frye, Matthew Jacob. *Whiteness of a Different Color: European Immigrants and the Alchemy of Race*. Cambridge, MA: Harvard University Press, 1999.

Robert Gottlieb. *Forcing the Spring: The Transformation of the American Environmental Movement.* New York: Island Press, 2005.

Grady, Wayne. *The Great Lakes: The Natural History of a Changing Region.* Vancouver: Greystone Books, Douglas & McIntyre Publishing Group, 2007.

Greenburg, Joel. *A Natural History of the Chicago Region*. Chicago: University of Chicago Press, 2002.

Gregg, Sarah M. *Managing the Mountains: Land Use Planning, the New Deal, and the Creation of a Federal Landscape in Appalachia*. New Haven: Yale University Press, 2013.

Gross, Miriam. *Farewell to the God of Plague: Chairman Mao's Campaign to Deworm China*. Berkeley, CA: University of California Press, 2016.

Guglielmo, Jennifer. *Living the Revolution: Italian Women's Resistance and Radicalism in New York City, 1880-1945*. Chapel Hill, NC: University of North Carolina Press, 2012.

Hahn, Steven. *The Roots of Southern Populism: Yeomen Farmers and the Transformation of the Georgia Upcountry, 1850-1890*. New York: Oxford University Press, 2006.

Halberstam, David. *The Fifties*. New York: Ballatine Books, 1994.

Halpern, Rick. *Down on the Killing Floor: Black and White Workers in Chicago's Packinghouses, 1904-54*. Urbana: University of Illinois Press, 1997.

Hamby, Alonzo L. *Liberalism and Its Challengers: From F.D.R. to Bush* New York: Oxford University Press, 1992.

Hayden, Dolores. *Building Suburbia: Green Fields and Urban Growth, 1820-2000*. New York: Vintage Books, 2003.

Hays, Samuel. *Conservation And The Gospel Of Efficiency: The Progressive Conservation Movement, 1890–1920*. 1959.

Hill, Libby. *The Chicago River: A Natural and Unnatural History*. Carbondale, IL: Southern Illinois University Press, 2016.

Hofstadter, Richard. *The Age of Reform*. New York: Vintage Reprint, 2004.

Hoy, Suellen. *Chasing Dirt: The American Pursuit of Cleanliness*. New York: Oxford University Press, 1996.

Howe, Daniel Walker. *What Hath God Wrought: The Transformation of America, 1815-1848*. New York: Oxford University Press, 2007.

Hurley, Andrew. *Environmental Inequalities: Class, Race and Industrial Pollution in Gary Indiana, 1945-1980*. University of North Carolina Press. Chapel Hill, North Carolina. 1995.

Hyde, Anne F. *Empires, Nations, Families: A New History of the North American West, 1800-1860*. New York: Ecco, 2012.

Jacobs, Margaret. *White Mother to a Dark Race: Settler Colonialism, Maternalism, and the Removal of Indigenous Children in the American West and Australia, 1880-1940*. Lincoln, NE: University of Nebraska Press, 2011.

Jacoby, Karl. *Crimes Against Nature*: *Squatters, Poachers, Thieves, and the Hidden History of American Conservation.* Berkeley, CA: University of California Press, 2014.

Jones, Christopher F. *Routes of Power: Energy and Modern America*. Cambridge: Harvard University Press, 2014.

Kazin, Michael. *American Dreamers: How the Left Changed the Nation* New York: Alfred A. Knopf, 2011.

Keating, Ann Durkin. *Rising Up From Indian Country: The Battle of Fort Deaborn and the Birth of Chicago*. Chicago: University of Chicago Press, 2012.

Kelman, Ari. *A River and Its City: The Nature of Landscape in New Orleans*. Berkeley: University of California Press, 2003.

Kennedy, David. *Freedom from Fear: The American People in Depression and War, 1929-1945*. New York: Oxford University Press, 2001.

----------. *Over Here: The First World War and American Society*. New York: Oxford University Press, 2004.

Kiechle, Melanie. *Smell Detectives: An Olfactory History of Nineteenth-Century Urban America.* Seattle: University of Washington Press, 2017.

Kinkela, David. *DDT and the American Century: Global Health, Environmental Politics, and the Pesticide That Changed the World*. Chapel Hill: University of North Carolina Press, 2011.

Klingle, Matthew. *Emerald City: An Environmental History of Seattle*. New Haven, CT: Yale University Press, 2006.

Lanyon, Richard. *Building the Canal to Save Chicago*. Chicago: Lake Claremont Press, 2012.

Lears, T.J. Jackson. *No Place of Grace: Antimodernism and the Transformation of American Culture, 1880-1920*. Chicago: University of Chicago Press, 2004.

----------. *Rebirth of a Nation: The Making of Modern America, 1877-1920*. New York: Harper Collins Publishers, 2009.

McCammack, Brian. *Landscapes of Hope: Nature and the Great Migration in Chicago* Cambridge, MA: Harvard University Press, 2017.

McClendon, Dennis. *Chicago Growth: 1850-1900*. Urbana, IL: University of Illinois Press, 2012.

McCool, Daniel. *River Republic: The Fall and Rise of America's Rivers*. New York: Columbia University Press, 1983.

McGerr, Michael. *A Fierce Discontent: The Rise and Fall of the Progressive Movement in America, 1870-1920*. New York: Oxford University Press, 2005.

McNeur, Catherine. *Taming Manhattan: Environmental Battles in the Antebellum City* Cambridge, MA: Harvard University Press, 2017.

McPherson, James. *The Battle Cry of Freedom: The Civil War Era*. New York: Oxford University Press, 2003.

Meinig, D.W. *The Shaping of America: A Geographical Perspective on 500 Years of History, Vol. I: Atlantic America, 1492-1800.* New Haven, CT: Yale University Press, 1988.

Miller, Donald L. *City of the Century: The Epic of Chicago and the Making of America.* Urbana: University of Illinois Press, 1997.

Mitchell, Timothy. *Rule of Experts: Egypt, Techno-Politics, Modernity*. Berkeley, CA: University of California Press, 2002.

Monkkonen, Eric H. *America Becomes Urban: The Development of U.S. Cities and Towns, 1780-1980.* Berkeley, CA: University of California Press, 1988.

Morris, Christopher. *The Big Muddy: An Environmental History of the Mississippi and its Peoples from Hernando de Soto to Hurricane Katrina*. New York: Oxford University Press, 2012.

Nash, Roderick. *The Nervous Generation: American Thought, 1917-1930* Chicago: Elephant Paperbacks, 1990.

Needham, Andrew. *Powerlines: Phoenix and the Making of the Modern Southwest*. Princeton, NJ: Princeton University Press, 2016.

Nugent, Walter. *Progressivism: A Very Short Introduction*. New York: Oxford University Press, 2010.

Pacyga, Dominic. *Polish Immigrants and Industrial Chicago: Workers on the South Side, 1880-1922*. Chicago: University of Chicago Press, 1991.

----------. *Chicago: A Biography*. Chicago: University of Chicago Press, 2011.

Parrish, Michael E. *Anxious Decades: America in Prosperity and Depression, 1920-1941* New York: W.W. Norton, 1994.

Perales, Monica. *Smeltertown: Making and Remembering a Southwest Border Community*. Chapel Hill, NC: University of North Carolina Press, 2010.

Pierce, Bessie Louise. *A History of Chicago: Volume III: The Rise of a Modern City, 1871-1893*. Chicago: The University of Chicago Press, 2007.

Platt, Harold. *Shock Cities: The Environmental Transformations of Manchester and Chicago*. Chicago: The University of Chicago Press, 2005.

Pritchard, Sara. *Confluence: The Nature of Technology and the Remaking of the Rhone*. Cambridge, MA: Harvard University Press, 2011.

Righter, Robert W. *The Battle Over Hetch Hetchy: America's Most Controversial Dam and the Birth of Modern Environmentalism*. New York: Oxford University Press, 2005.

Rodgers, Daniel T. *Atlantic Crossings: Social Politics in a Progressive Age*. Cambridge, MA: Harvard University Press, 2009.

Roediger, David. *Wages of Whiteness: Race and the Making of the American Working Class*. New York: Verso, 2007.

Rogaski, Ruth. *Hygienic Modernity: Meanings of Health and Disease in Treaty-Port China*. Berkeley, CA: University of California Press, 2004.

Rome, Adam. *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism*. New York: Cambridge University Press, 2001.

Rosen, Christine. *The Limits of Power: Great Fires and the Process of City Growth in America.* Berkeley, CA: University of California Press, 1986.

Rosenberg, Charles. *The Cholera Years, 1836, 1849, and 1866*. Chicago: University of Chicago Press, 1987.

Schmalzer, Sigrid. *Red Revolution, Green Revolution: Scientific Farming in Socialist China* Chicago: University of Chicago Press, 2016.

Schneider, Daniel. *Hybrid Nature: Sewage Treatment and the Contradictions of the Industrial Ecosystem*. Cambridge: The MIT Press, 2011.

Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press, 1998.

Shabazz, Rashad. *Spatializing Blackness: Architects of Confinement and Black Masculinity in Chicago*. Urbana, IL: University of Illinois Press, 2015.

Smith, Carl. *City Water, City Life: Water and the Infrastructure of Ideas in Urbanizing Philadelphia, Boston, and Chicago*. Chicago: University of Chicago Press, 2013.

----------. *The Plan of Chicago: Daniel Burnham and the Remaking of an American City* Chicago: University of Chicago Press, 2007.

Solzman, David M. *The Chicago River: An Illustrated History and Guide to Its Waterways*. Chicago: University of Chicago Press, 2006.

Sugrue, Thomas J. *The Origins of the Urban Crisis: Race and Inequality in Postwar Detroit*. Princeton, NL: Princeton University Press, 2008.

Tarr, Joel. *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective*. Akron: University of Akron Press, 1996.

Taylor, George Rodgers. *The Transportation Revolution*, *1815-1860*. New York: Harper and Row, 1951.

Teaford, Jon C. *The Metropolitan Revolution: The Rise of Post-Urban America*. New York: Columbia University Press, 2006.

----------. *The Twentieth-Century American City: Problem, Promise, and Reality*. Baltimore, MD: Johns Hopkins University Press, 2016.

Tilt, Bryan. *Dams and Development in China: The Moral Economy of Water and Power*. New York: Columbia University Press, 2014.

Turner, Kenneth. *Crabgrass Frontier: The Suburbanization of the United States*. New York: Oxford University Press, 1985.

Tyrell, Ian. *Crisis of a Wasteful Nation: Empire and Conservation in Theodore Roosevelt's America*. Chicago: University of Chicago Press, 2015.

Various Authors. *The Encyclopedia of Chicago*. Chicago: University of Chicago Press, by the Newberry Library, 2004.

Wade, Louise Carroll. *Chicago's Pride: The Stockyards, Packingtown, and Environs in the Nineteenth Century*. Urbana: University of Illinois Press, 1981.

Walker, Brett L. *Toxic Archipelago: A History of Industrial Disease in Japan*. Seattle, WA: University of Washington Press, 2010.

Warner Jr., Sam Bass. *The Private City: Philadelphia in Three Periods of Growth*. Philadelphia, PA: University of Pennsylvania Press, 1987.

Washington, Sylvia Hood. *Packing Them In: An Archeology of Environmental Racism in Chicago, 1865-1954*. Lanham, MD: Lexington Books, 2005.

Watkins, T.H. *The Great Depression: America in the 1930s.* Boston: Little, Brown and Company, 1993.

Webb, Constance Bell. *A History of Contagious Disease Care in Chicago Before the Great Fire* Chicago: University of Chicago Press, 1940.

White, Richard. *The Middle Ground: Indians, Empires, and Republics in the Great Lakes Region, 1650-1815*. Cambridge: Cambridge University Press, 1991.

----------. *The Organic Machine: The Remaking of the Columbia River*. New York: Hill and Wang, 1995.

----------. *Railroaded: The Transcontinentals and the Making of Modern America*. New York: W.W. Norton and Co., 2012.

----------. *The Republic for Which it Stands: The United States During Reconstruction and the Gilded Age, 1865-1896*. New York: Oxford University Press, 2017.

Worster, Donald. *Dust Bowl: Life on the Southern Plains in the 1930s*. New York: Oxford University Press, 1979.

Worster, Donald. *Rivers of Empire: Water, Aridity, and the Growth of the American West*. New York: Oxford University Press, 2002.

Wrobel, David M. *American West, Global Frontier: Travel, Empire, and Exceptionalism from Manifest Destiny to the Great Depression*. Albuquerque, NM: University of New Mexico Press, 2013.

Zimring, Carl. *Clean and White: A History of Environmental Racism in the United States*. New York: New York University Press, 2017.

Articles

Beatty, William K. "When Cholera Scourged Chicago." *Chicago History*, Vol. 11, 1. (Spring, 1982).

Colten, Craig E. "Raising New Orleans: Historical Analogs and Future Environmental Risks." *Environmental History*. Vol. 23, 1. (2018): 135-142.

----------. "Reintroducing Nature to New Orleans: Wetlands in New Orleans." *Environmental History*. Vol. 1, 2. (2002): 226-246.

Conzen, Michael and Neil Harris. "Introduction." *The WPA Guide to Illinois: The Federal Writers' Project Guide to 1930s Illinois*. New York: Pantheon Books, 1983.

Kiechle, Melanie. "Navigating by Nose: Fresh Air, Stench Nuisance, and the Urban Environment, 1840-1880." *Journal of Urban History*. Vol. 42, 4. (2016): 753-771.

McCammack, Brian. "'My God, They Must Have Riots on Those Things All the Time:' African American Geographies and Bodies on Northern Urban Public Transportation." *Journal of Social History*. Vol. 43, 4. (July, 2010): 973-988.

McNeur, Catherine. "'The Swinish Multitudes:' Controversies over Hogs in Antebellum New York City." *Journal of Urban History*. Vol. 37, 5. (September, 2011): 639-660.

----------. “Taming Manhattan: Environmental Battles in the Antebellum City.” *New York History*. Vol. 99, 3. (2018): 475-478.

Melosi, Martin. “The Place of the City in Environmental History.” *Environmental History Review*. 17, 1 (1993): 1-23.

Platt, Harold L. “‘Clever Microbes:’ Bacteriology and Sanitary Technology in Manchester and Chicago During the Progressive Age.” *Osiris*. Vol. 19. (2004): 149-166.

----------. “Exploding Cities: Housing the Masses in Paris, Chicago, and Mexico City, 1850-2000.” *Journal of Urban History*. Vol. 36, 5. (September 2010): 575-593.

----------. “Jane Addams and the Ward Boss Revisited: Class, Politics, and Public Health in Chicago, 1890-1930.” *Environmental History*. Vol. 5, 2. (2000): 194-222.

Worster, Donald. “Transformations of the Earth: Toward and Agroecological Perspective in History.” *Journal of American History*. 76 (1990): 1087-1103.

Theses and Dissertations

Foote, Lorien. *Francis George Shaw and Nineteenth-Century Reform*. PhD. Dissertation. Norman, OK: University of Oklahoma, 2013.

Corpolongo, John. *A River in Reverse: An Environmental History of the Chicago Sanitary and Ship Canal.* Master’s Thesis Norman, OK: University of Oklahoma, 2015.

Internet Resources

The Chicago Portage. “Collections.” www.drupal.library.cmu.edu/chicago.

The website of the Encyclopedia of Chicago; www.encyclopedia.chicagohistory.org. "The Chicago Sanitary and Ship Canal."

Google Books. www.books.google.com.

The website of the United States Geological Survey; www.usgs.gov. "The Chicago Sanitary and Ship Canal and System."

The website of the United States Fish and Wildlife Service; www.fws.gov. "Asian Carp in the Illinois River Basin."